PUMPING TEST DATA ANALYSIS RIDGECREST WELL FIELD CITY OF ALBUQUERQUE, NEW MEXICO

FEBRUARY 2, 1988

Prepared for

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SECTION I

PURPOSE OF STUDY

The City of Albuquerque has experienced declines in the water level of the aquifer which underlies the City. The declining water table has resulted in the need to lower the pumps in many of the City's wells. Black & Veatch and Groundwater Management, Inc. (GMI) have been retained to evaluate the declining water levels, to predict near term pumping levels, and to analyze well and pump rehabilitation requirements.

The phase of the study covered in this report was limited to conducting pumping tests on selected wells in the Ridgecrest Well Field. The purpose of these tests was to collect the data necessary to evaluate the current well performance, pump performance, and aquifer characteristics. This report contains the data collected during the pumping tests on wells in the Ridgecrest Well Field, a discussion of the methodologies used to analyze the data, and results of the data analysis. Similar Well Pumping Data Analysis Reports have been prepared for each of the City's Well Fields.

SECTION II

TEST PROCEDURE

Pumping tests were conducted on the City's wells during the period from February 2 to February 28, 1987. Pumping tests were performed on Ridgecrest Wells No. 1, No. 2, and No. 4 under a previous study. The results of the tests are included in this report. Tests on wells in the Ridgecrest Well Field were conducted on the following dates:

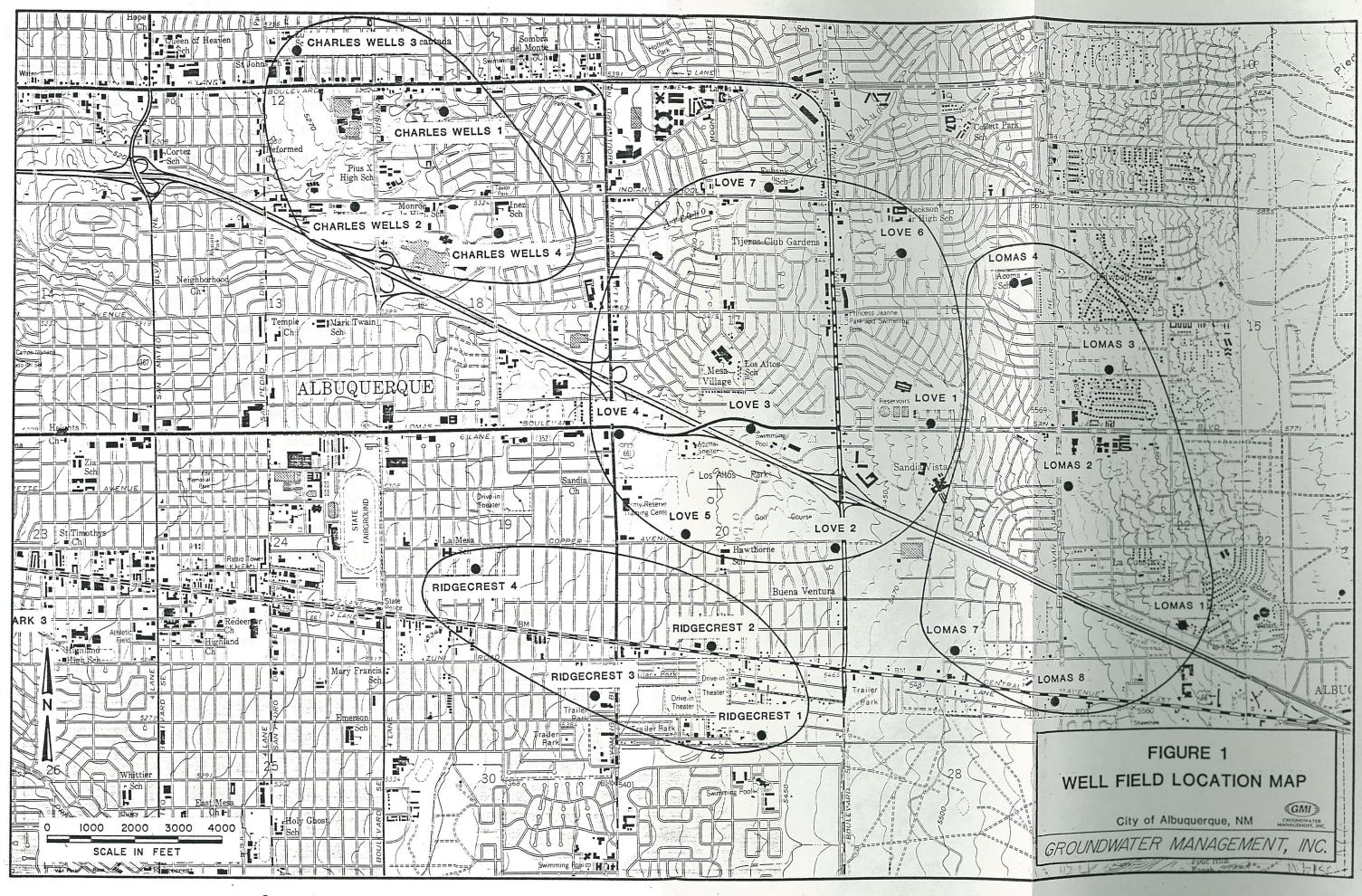
WELL	DATE TESTED	
Ridgecrest :	1 .	April 17, 1985
Ridgecrest 2	2	April 10, 1985
Ridgecrest :	3	February 21, 1987
Ridgecrest	4	April 16, 1985

The locations of these wells are shown on Figure 1.

All wells were rested for at least 24 hours prior to being tested. With the exception of Ridgecrest 3, all wells within a one mile radius of the well being tested were shut down 24 hours before the test and remained off throughout the test. For the Ridgecrest 3 pumping test, all wells within one-half mile were rested prior to and during the test.

Precedent water level measurements were taken for 80 minutes prior to the Ridgecrest 3 pumping test as requested by the City. Throughout the city-wide testing program, only a few of these showed any trend. Of those that showed a trend, it could not be determined if the changes were due to nearby

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pumpage or other effects, and hence the longer term effects during the test could not be accurately evaluated. Projection of the trends resulted in only small changes in the calculated transmissivity values so these theoretical corrections were ignored in calculating results.

Drawdown measurements for the Ridgecrest 3 test were collected with the well pumping at a constant rate for a period of 200 minutes. The pump was then shut down and recovery readings were collected for 200 minutes. For the Ridgecrest wells tested in 1985, the tests were generally conducted by pumping the well at a constant rate for a period of five to eight hours. The pump was then shut down and recovery readings were collected for approximately 100 minutes. Observation well drawdown and recovery data were also collected from other wells in the vicinity of the pumped well when time and scheduling permitted.

Water level data were obtained with electric line measurements where possible. These data are generally accurate to
0.03 foot. In some wells, difficulty of access or the
presence of oil on the water made electric line measurements
difficult or impossible to obtain. Measurements in these
wells were made by airline.

All airline readings were in pounds per square inch (psi).

Airline readings were made to an accuracy of 0.5 psi

(1.2 ft), although an attempt was made to read to 0.25 psi

(0.6 ft). It should be noted that the airline readings obtained during these tests are valid for determining the relative changes in water levels, but may not represent the exact depth to water since the length of airline in the well is not known accurately.

Discharge measurements were made with in-line totalizer meters when possible. On wells which were not equipped with operating totalizer meters, the well discharge rate was determined by readings from the well field "all flow" meter. All discharge measurements are subject to the accuracy of the measuring device. Any inaccuracy in measurement of the well discharge rate will have an affect upon the aquifer transmissivities determined from the tests.

Power consumption data were collected from the electric meters on the wells equipped with electric motors. Average power consumption rates for wells equipped with natural gas engines were provided by the City Staff. These data were used to calculate the efficiencies for the pump installations.

Sand production was measured at Ridgecrest 3 with a Rossum sand tester. Sand production measurements were collected at 5, 15, 30, 45, and 60 minutes after pump start-up. For the Ridgecrest 3 test, discharge pressure, water temperature, and meter totalizer measurements were recorded at approximately 30-minute intervals throughout the pumping portion of the test.

Water samples were collected for various analyses during the test procedures. All samples were collected from the taps which are located on the well discharge pipeline. Samples were collected in containers provided by the laboratory selected to perform the analyses.

A water sample for Ridgecrest 3 was collected approximately 15 minutes after pump start-up. These samples were stored on ice and delivered within 8 hours to the City of Albuquerque, Public Works Department, Liquid Waste Division laboratory for Total Plate Count and Total Organic Carbon (TOC) analyses. At the City's request, additional samples were collected for Ridgecrest 3 approximately 150 minutes after pump start-up; these samples were iced and delivered within 24 hours to the Liquid Waste Division laboratory. However, samples collected on Saturdays were delivered to the laboratory on the following Monday.



An additional water sample was collected for Ridgecrest 3 at approximately 150 minutes after pump start-up. This sample was collected in bottles containing appropriate preservatives, and shipped to Wilson Laboratories in Salina, Kansas, for standard water quality analysis. Field conductivity and pH were measured with portable meters during the Ridgecrest 3 pumping test.

A water sample was collected from each well tested in 1985 and sent to Wilson Laboratories in Salina, Kansas, for a standard water quality analysis. Water samples were also collected by the City staff during the 1985 tests and analyzed by the City's Water Resouces Department Laboratory for total plate count. The sampling procedure for the 1985 tests was to rest the well for 8 hours, then collect a water sample after 2 hours of pumping.

SECTION III

METHODOLOGY

The drawdown and recovery data were analyzed by the classical methods based upon the Theis Equation and the Jacob Equation. The interested reader is referred to Freeze and Cherry (1979), Walton (1962), and Driscoll (1986), for discussions of the derivation and application of these equations.

Drawdown data in the pumped well were plotted as a function of time on semi-log paper and analyzed using the following relationship developed from the Jacob Equation:

$$\mathbf{T} = \frac{264 \text{ Q}}{\Delta \text{ s}}$$

Where:

T = transmissivity, gallons per day per foot (gpd/ft)

Q = discharge rate, gallons per minute (gpm)

 Δ s = change in drawdown over any one log cycle of time, feet (ft)

The recovery data from the pumped wells were analyzed by plotting on semi-log paper residual drawdown (s') against the ratio of t/t', where t is the elapsed time since the pumping test started and t' is the elapsed time since the



pump was stopped. Transmissivity was then determined by the following relationship developed from the Jacob Equation:

$$T = \frac{264 \text{ Q}}{\Delta \text{ s'}}$$

Where:

 Δ s' = change in residual drawdown per log cycle of values of t/t', ft.

The Jacob Equation is valid for situations where pumping time is large and the distance from the pumped well to the point where drawdown is being measured is small. These conditions applied at the pumped wells in all cases.

The practice of pumping some of the City wells to waste upon start-up affected the discharge rate and drawdowns at the start of tests on some wells. The larger initial pumping rates increase initial drawdowns, and then tend to allow some recovery as the pumping rate declines when the well begins pumping into the distribution system against greater pressure heads. This resulted in a distortion of the time-drawdown curves during the initial stages of some tests.

Time-drawdown relationships for water table aquifers are also affected by delayed water table response. During the initial stages of a pumping test, a water table aquifer reacts in the same way as does a confined aquifer. The apparent specific yield during this part of the test will be quite small, on the order of 0.0001. At later times the time-drawdown curve will be flattened due to slow drainage of water from the portion of the aquifer which has been dewatered and/or non-radial flow. The apparent storativity during this portion of the test will be much larger.

Values for storativity cannot be determined from data collected in the pumped well due to inaccuracies caused by well losses and uncertainty as to the effective well radius. An appropriate value for the storativity for long-term pumpage of an unconfined aquifer is in the range of 0.1 to 0.2. For the purposes of calculating well efficiencies, an apparent storativity of 0.01 has been used. It is believed that this is the most appropriate value for analyses based upon relatively short pumping periods such as these pumping tests.

Both the time-drawdown and recovery data were analyzed in order to determine the transmissivity value for each pumping test. Analysis of the two sets of data sometimes



yielded significant differences in the resulting values for transmissivity. A best estimate of the actual transmissivity value was made based upon professional judgement and experience in analysis of pumping test data.

Well efficiency is a measure of the effectiveness of a well in extracting water from an aquifer. Factors which affect well efficiency include the drilling procedures, well development procedures, gravel pack design and placement, screen design and placement, and screen plugging. Well efficiency is calculated by:

Well Eff. =
$$\frac{Q/s \text{ act}}{Q/s \text{ theo}}$$
 x 100

Where:

Q/s act = actual specific capacity, gpm per foot of drawdown.

Q/s theo = theoretical specific capacity, gpm per foot of drawdown.

The specific capacity values determined from pumping tests are useful for providing a baseline against which future well performance can be evaluated, if the specific capacities are measured in a consistent manner. For purposes of this report, all specific capacities are based upon a pumping period of 150 minutes.



The theoretical specific capacity of a pumped well is computed by the Jacob Equation written in the form:

Q/s_{theo} =
$$\frac{T}{264 \log \left(\frac{0.3Tt}{r_w^2S}\right)}$$

Where:

Q/s theo = theoretical specific capacity, gpm/ft

= transmissivity, gpd/ft

= time, days

= radius of the well, ft

= storativity.

As mentioned previously, the theoretical specific capacities computed for determining well efficiencies were based upon a storativity of 0.01 and a pumping time of 150 minutes.

The efficiency of a pump system is defined as the ratio of output energy to input energy, or:

Eff. =
$$\frac{\text{WHP}}{\text{IHP}}$$
 x 100

Where:

= water horsepower WHP

= input horsepower. IHP



Water horsepower is determined by the relationship:

WHP =
$$\frac{Q \text{ H}}{3960}$$

Where:

Q = pumping rate, gpm

H = total head across the pump, ft

Where the total head (H) consists of the sum of the discharge pressure, pumping lift, and head loss in the column pipe.

Input horsepower for electric motors is calculated from the formula:

IHP =
$$4.826 \times Kh \times M \times R/t$$

Where:

Kh = meter constant

M = meter multiplier

R = total revolutions of watt-hour meter disk

t = time for total revolutions of disk, seconds.

The electric power consumption as a function of pumpage was computed by:

$$KWH/1000 gal = \frac{60 \times Kh \times M \times R/t}{Q}$$



Where:

kilowatt - hours KWH and the other terms are as previously defined.

The operating energy costs per 1000 gallons (\$/1000 gal) of water pumped were determined for the electric motor driven pumps by:

 $\frac{1000 \text{ gal}}{2} = \frac{\text{KWH}}{2} \times \frac{\text{KWH}}{1000 \text{ gal}}$

where:

electricity cost. \$/KWH

SECTION IV

RESULTS

The results of the standard plate count (bacteriological) tests are included in Appendix A. The data collected during the pumping tests are contained in Appendix B. Included in Appendix B for each well are well data summary sheets, pumping test data, arithmetic water level graphs, semi-log time-drawdown graphs, pump efficiency worksheets, copies of the manufacturer's pump curves showing the current operating point, and the water quality report. Pump curves and pump setting information were provided by the City, and are assumed to be up-to-date and accurate. The City also provided electricity rates.

The water quality report gives the results of the Standard Chemical Water Analysis. A value of 0.00 signifies that analysis results are below detectable limits for a particular chemical constituent. Correspondence from the water analysis laboratory containing the limits of detection for each constituent tested is included in Appendix B.

The results of the analyses are summarized in Table 1. Operating energy costs per 1000 gallons of water pumped are presented in Table 2. The land surface and static water level elevations are shown in Table 3. The static water



TABLE 1
CITY OF ALBUQUERQUE
PUMPING TEST DATA SUMMARY

WELL NAME	PUMP SETTING (ft)	PUMPING RATE (gpm)	OBSERVED SPECIFIC CAPACITY (gpm/ft)	THEORETICAL SPECIFIC CAPACITY (gpm/ft)	STATIC WATER LEVEL (ft)	BEST ESTIMATE OF TRANSMISSIVITY (gpd/ft)	COMPUTED WELL EFFICIENCY (%)	PUMP SYSTEM EFFICIENCY (%)	KWH PER 1000 GALLONS
RIDGECREST 1	653	1,270	29	34	572	45,000	85	58	3.57
RIDGECREST 2	680	3,010	81	116	541	170,000	70	68	3.08
RIDGECREST 3	660	2,890	90	166	510	249,000	54	70	2.93
RIDGECREST 4	580	2,490	71	185	465	280,000	38	71	2.98

NOTES: 1. Specific capacity determined from drawdown obtained after pumping for 150 minutes.

2. Computed well efficiency may differ from previous reports for wells tested in 1985 due to slight modifications in the calculation procedure.

TABLE 2 CITY OF ALBUQUERQUE, NEW MEXICO OPERATING ENERGY COSTS

ELECTRICITY COSTS (\$/1000 gal)

							-	
WELL NAME	PUMP SETTING (ft)	PUMPING RATE (gpm)	KWH PER 1000 Gallons	WINTER OFF-PEAK RATE	WINTER PEAK RATE	SUMMER OFF-PEAK RATE	SUMMER PEAK RATE	
RIDGECREST 1	653	1,270	3.57	0.16	0.28	0.19	0.45	
RIDGECREST 2	680	3,010	3.08	0.14	0.24	0.16	0.39	
RIDGECREST 3	660	2,890	2.93	0.13	0.23	0.16	0.37	
RIDGECREST 4	580	2,490	2.98	0.13	0.23	0.16	0.38	

NOTES:

1. Based on electricity rates as follows: Winter off-peak - \$0.0450/kwh

- \$0.0780/kwh Winter peak Summer off-peak - \$0.0530/kwh - \$0.1260/kwh Summer peak

prepared by: GROUNDWATER MANAGEMENT, INC.

TABLE 3
CITY OF ALBUQUERQUE
STATIC WATER LEVEL DATA

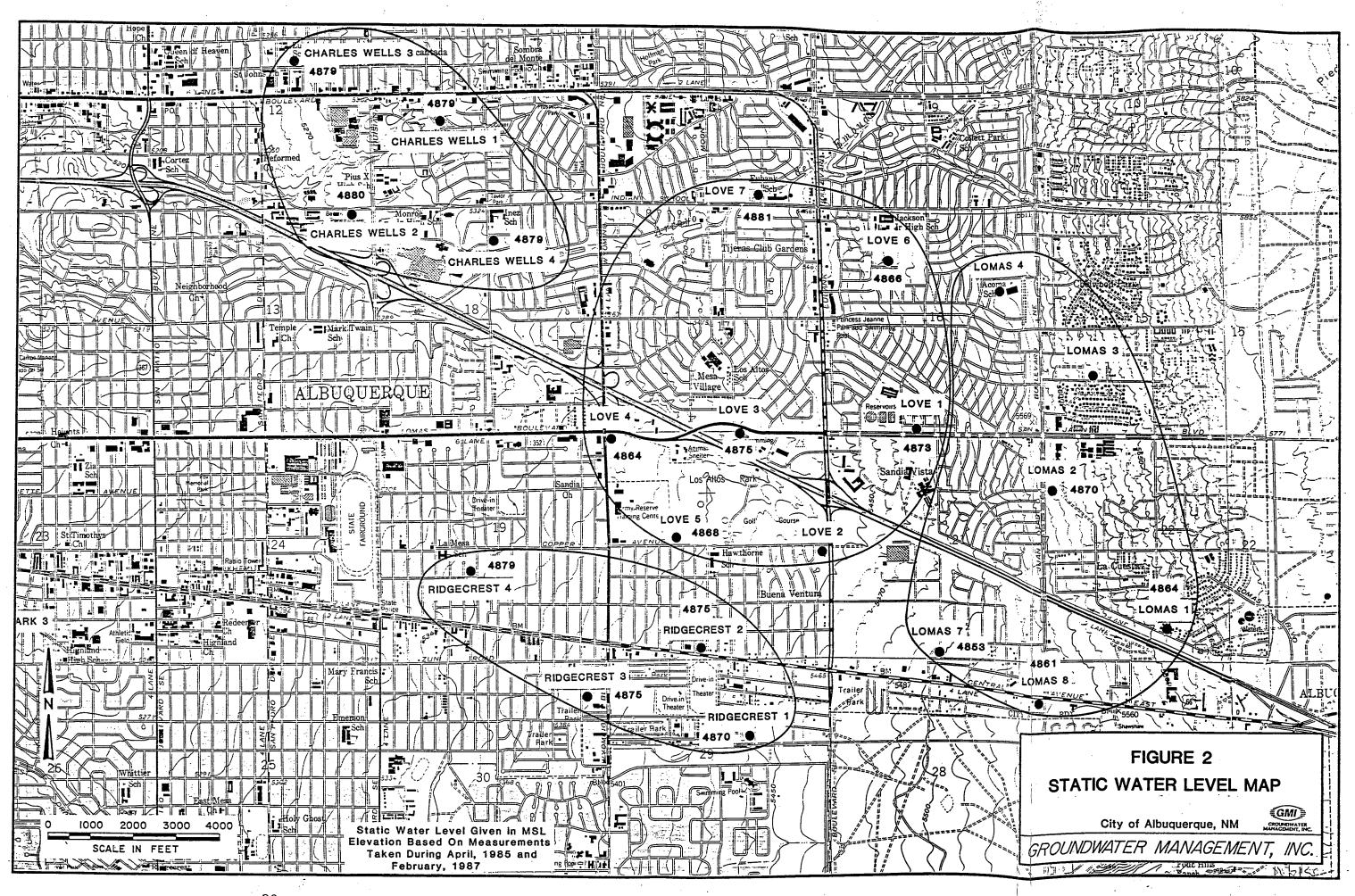
Well	Ground Surface Elevation (MSL)	Depth to Water (FT)	Water Level Elevation (MSL)
RIDGECREST 1	5442	572	4870
RIDGECREST 2	5416	541	4875
RIDGECREST 3	5385	510	4875
RIDGECREST 4	5344	465	4879

prepared by: GROUNDWATER MANAGEMENT, INC.

levels from Table 3 have been used to develop the water table map shown as Figure 2.

Analysis of Table 1 indicates that transmissivities vary from 45,000 to 280,000 gpd/ft in the wells that were tested, and that specific capacities vary from 29 to 90 gpm per foot of drawdown. It is apparent that portions of the aquifer in the study area are much more permeable than others. These highly permeable zones are most likely located in areas where materials in the alluvial fans were well sorted, generally in the middle portion of the fans. Significant pumping cost savings due to increased specific capacities could be realized if the City locates future well sites in areas of higher transmissivities.

Well efficiencies, which reflect head losses as water moves through the gravel pack and well screen into the well, range from 38 percent in Ridgecrest Well No. 4 to 85 percent in Ridgecrest Well No. 1. Low well efficiency results in increased pumping costs due to greater drawdown which occurs for a given pumping rate. Pump system efficiencies range from 58 percent at Ridgecrest Well No. 1 to 71 percent at Ridgecrest Well No. 4.



Pumping costs are a function of the pumping head, pumping rate, and pump system efficiency. The kilowatt hours of electricity consumed per 1000 gallons pumped ranged from 2.93 at Ridgecrest Well No. 3 to 3.57 at Ridgecrest Well No. 1. Considerable savings in power costs could be realized by the City if greater efficiencies could be achieved on their pumping installations.

Bacteriological sampling of Ridgecrest Well No. 3 consisted of analysis of standard plate count of a water sample collected 15 minutes after start-up. The results reveal a relatively low level of bacteria. The results of the standard plate count on Ridgecrest Wells No. 1, No. 2, and No. 4 may not be comparable due to any difference in sampling and testing procedures. The standard plate count results are presented in Table 4. The standard water quality analyses indicate that the water from the tested wells is of generally good quality, but may be corrosive in some cases.

Ridgecrest Well No. 3 produced relatively high amount of sand during the initial portion of the test. Sand production was zero after 60 minutes of pumping.

TABLE 4 CITY OF ALBUQUERQUE RESULTS OF BACTERIOLOGICAL TESTS

WELL NAME		STANDARD PLATE COUNT (Counts/ml)			
Ridgecrest	1	54			
Ridgecrest	2	78			
Ridgecrest	3	. 6			
Ridgecrest	4	342			

prepared by: GROUNDWATER MANAGEMENT, INC.

References

- 1. Freeze, R. Allen and John A. Cherry, 1979. Groundwater.

 Prentice-Hall, Inc. Englewood Cliffs, New Jersey.
- Driscoll, Fletcher G., 1986. Groundwater and Wells,
 Second Edition. Johnson Division. Saint Paul, Minnesota.
- 3. Walton, William C., 1962. Selected Analytical Methods for Well and Aquifer Evaluation. Bulletin 49, Illinois State Water Survey. Urbana, Illinois.

APPENDIX A

TOTAL PLATE COUNT RESULTS



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR

CHIEF ADMINISTRATIVE OFFICER DEPUTY CAO PUBLIC SERVICES DEPUTY CAO PLANNING/DEVELOPMENT

KEN SCHULTZ

GENE ROMO

RECOLARMEZ BILL MUELLER

APR - 1 1987

March 26, 1987

GROUNDWATER MGMT. K.C., KS

Mr. Bruce Kroeker Vice President Groundwater Management, Inc. 610 South 38th Street Kansas City, Kansas 66106

Re: Well Testing - Standard Plate Counts

Dear Bruce:

Attached please find a copy of standard plate counts for samples your firm provided to Mr. Emory Moore, during the Well Testing Project recently completed.

Please call if you have any questions.

Sincerely,

Mike E. Mendoza, P.E.

Assistant Utility Engineer Utility Design Section

Publ (c Works Department

Attachment

MEM:1k

xc: Gene Leyendecker Emory Moore Daniel Linstedt File 67.5

326

MELL	DATE	SIANDI PLATE cnt/I	CT T.O.C.	DETECTOR DEVISE cnt/1 ml	可引出 医拉拉曼氏 医克拉曼氏 医克拉曼氏 医二甲基乙二甲基乙二甲基乙二甲基乙二甲基乙二甲基乙二甲基乙二甲基乙二甲基乙二甲基乙
ALAMEDA #1 ALAMEDA #2 AIRISCO #1 AFRISCO #2 AIRISCO #3 AFRISCO #4 BURTON #2	870210 870220 870204 870212 870220 870317 870226		0 0.058 11 0.052 20 0.140 4 0.047 6 0.200 0 0.125 0 0.040	0 100	
BURTON #3 CANDELARIA #2 CONDELARIA #4 CHARLES #1 COLLEGE #1 COLLEGE #2 DON #1	870205 870221 870228 870212 870212 870221		5 0.010 21 0.150 0 0.077 92 0.040 188 0.073 143 0.088 2 0.030	100 100 0 100	•
DURANES #1 DURANES #2 DURANES #3 DURANES #4 DURANES #5 DURANES #6 DURANES #7	870209 870210 870212 870217 870219 870225		0 0.388 0 0.264 8 0.228 100 0.090 24 0.096 62 0.221 1 0.370 0 0.156	0 0 100 0	
GRIEGOS #1 GRIEGOS #2 GRIEGOS #3 GRIEGOS #4 LEAVITT #1 LEAVITT #2 LOMAS #1 LUVE #4	870211 870213 870218 870216 870205 870209 870214 870228	•	2 0.370 10 0.330 1 0.140 108 0.063 780 0.120 230 0.030	0 0 0 0 0 0	
LYNDECKER #1 LYNDECKER #2 LYNDECKER #3 LYNDERCKER #4 MILES #1 PONDEROSA #2 PONDEROSA #3	870220 870218 870225 870217 870206 870205 870225		29 0.510 22 0.041 1 0.246 1 0.180 0 0.090 3 0.050 342 0.036	100 0 0 100 0	
PONDEROSA #4 PONDEROSA #6 PONDEROSA #7 PONDEROSA #9 RIUGECREST #3 SANTA BARBARA #1 SAN JOSE #1	870214 870227 870206 870223 870221 870223 870204		203 0.040 111 0.050 0 1.390 54 0.064 6 0.039 0 0.074 29 0.330	0	
SAN JOSE #2 SAN JOSE #3 THOMAS #1 THOMAS #2 THOMAS #3 THOMAS #4	870203 870206 870207 870204 870203 870210		3 0.100 0 0.124 189 0.110 0 0.080 11 0.090 0 0.058	5 1000 6 0 7 0 1000 1000 100000	
VOL-ANDIA #1 VOL-ANDIA #2 VOL-ANDIA #4 VOL-ANDIA #5 VOL-ANDIA #6 VOLCANO CLIFFS #1 VOLCANO CLIFFS #2	870217 870216 870219 870224 870226 870207 870211	£	3 0.333 0 0.010 49 0.12 17 0.070 2 0.10 0 0.04 194 0.04	0 0	
WOLKER #1 WEST MESO #1 WEST MESO #2 WEST MESO #4 YOLE #1 YOLE #2 YALE #3	870207 870218 870219 870223 870209 870211 870213	•	0 0.04 12 0.37 13 0.01 36 0.02 0 0.38 136 0.05 139 0.06	0 0 9 0 7 5 0 2 100	
AVERAGE MAXIMUM MINIMUM SIO DEV		· .	54 0.15 780 1.39 0 0.01 118 0.19	0 100000	

CARL RUSMANS E CAS CAMPE

CITY OF ALBUQUERQUE WATER RESOURCES DEPARTMENT LABORATORY

MEMORANDUM - June 18, 1985

TO

- Sam Cummins, Manager of Water Systems

- Bob Sidhu, Assistant Manager of Water Systems

FROM

- Emory Moore, Laboratory Suparvisor

SUBJECT

- STANDARD PLATE COUNTS:

By the 16th Edition of <u>Standard Methods</u>, there is no longer a recognized test listed as "standard plate count". The new designation is "total heterotrophic plate count - "C - hours".

The attached data were generated by inoculating a tryptone glucose extract agar plate using method 907B (spread plate method) with 0.33 milliliters of well water under aseptic conditions. The results are reported in count per 100 milliliters at 35°C after 72 hours.

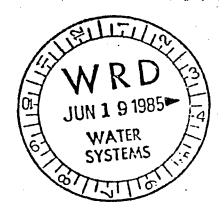
Tests were performed to determine if a cooler temperature in the incubator would improve growth. A second set of samples would be needed to confirm this, but tentative results are affirmative.

Attempts to differentiate species will be made upon arrival of reagents. A supplemental report will be issued at that time.

Enclosure

xc Dave C. Kersey, Chemist Hichael Irvine, Chemist

Doc. 386T, Arc. 0015T



JG#	WELL#	24HR CT/.33ML	72HR CT/.33ML	TOTAL CT/100ML
******	*****	*****	********	****
*****	*****	*****	*****	****
300	RIDGE#2	5	MILKY-3 SMCLEAR-23	7800
*****	. * * * * * * * * * * *	*******	**********	*****
301	RIDGE#4	Ø	YELLOW-3 MILKY-3 SMCLEAR-105	34200
******		*********	****	*****
302	RIDGE#1	0	MOLD(WHT)-1 WHITE-17	5400
(*******	·*********	********	*******	*******
3Ø3	LOVE#3	1	FUNGUS-1 YELLOW-2 MILKY-1	1200
(********	. * * * * * * * * * * * * * * *	*********	*********	*****
304	LOVE#1	3	WHITE-26 RUFFWHITE-6	9600
				•
·********	*******	****	****	*****
305	LOVE#6	1	WHITE-1 CREAM-10 SMCLEAR-232	72900
·*******	******	*****	******	*****
306	CHARLES#1	Ø	GREEN-4	1200
				•
	*****	*****	******	*****
307	CHARLES#4	Ø	YELLOW-4 CLEAR-1	1500
			•	
}Ø8	**************************************	**************************************	RUFFWHITE-1 WHITE-26 FUNGUS-1 SMCLEAR-49	**************************************
**************************************	**************************************	************	**************************************	*************
*****	*****	***********	. · ***********	*****
110	LDMAS#1	_ 16	SLIME-9 WHITF-12 FILA-2	13200

			WHITESLIM-3	•
*****	*****	******	****	****
815	CHARLES#2	29	CREAM-30 BROWNUCLE-2 MILKY-2 SMCLEAR-5	11700
*****	******	******	*****	*****
B 16	LOMAS#8	0	SMCLEAR-1 TAN-1 MILKY-2	1200
*****	******	***********	**********	******
B17	RIDGE#3	1	YELLOW-1 FUNGUS-1 LRGCREAM-1 MILKY-3 SMCLEAR-8	4200
*****	********	******	*****	*********
818	LOVE#5	3	BROWNUCLE-2 MILKY-4 CREAM-5	3300
*****	*****	******	*****	***********
B19	CHARLES#3	11	SMCREAM-4	4200
•			CLUMP=10	

YELLOW-2 FUNGI-1 MILKY-3

APPENDIX B

PUMPING TEST DATA

WELL AND PUMP TEST DATA

RIDGECREST WELL NO. 1

WELL DATA SUMMARY SHEET

CITY OF ALBUQUERQUE RIDGECREST WELL NO. 1

DATE OF PUMP TEST :	4-17-1785
TEST DISCHARGE RATE (gpm) :	1270
DISCHARGE PRESSURE (psi) :	13
STATIC WATER LEVEL (ft) :	572
WATER LEVEL MEASUREMENT METHOD :	M-Scope
PUMP SETTING (ft):	65 3
CURRENT SPECIFIC CAPACITY (gpm/ft):	29
ORIGINAL SPECIFIC CAPACITY (gpm/ft):	27
YEAR DRILLED :	1964
BOREHOLE DIAMETER (in):	28 (Assumed)
WELL DEPTH (ft):	1257
SCREEN TYPE :	Roscoe Moss Shutter Screen
SCREEN INTERVAL (ft):	633 - 1257

COMMENTS: Discharge measured by all-flow meter.

LAYNE-WESTERN COMPANY, INC. HYDROLOGY DIVISION PUMP TEST DATA

NAME: CITY OF ALBUQUERQUE DATE: 4-17-1985

LOCATION: RIDGECREST WELL NO.: 1 JOB NO.: D-699

TIME	ELAFSED	WATER	
OF DAY	TIME	LEVEL	DRAWDOWN
•			
801	0	572.17	0.00
802	. 1	604.64	32.47
803	2	604.20	32.03
804	3	605.19	33.02
805	4	606.02	33.85
806	5	606.48	34.31
808	. 7	606.45	34.28
810	9	607.41	35.24
812	11	607.98	35.81
816	15	608.97	36.80
821	20	609.88	37.71
826	, 25	610.61	38.44
831	30	611.17	39.00
836	35	611.71	39.54
841	40	612.18	40.01
851	50	612.91	40.74
901	60	613.54	41.37
911	70	614.04	41.87
921	80	614.45	42.28
931	90	614.79	42.62
941	100	615.14	42.97
1001	120	615.71	43.54
1031	150	616.35	44.18
1101	180	616.91	44.74
1201	240	617.69	45.52
1301	300	618.26	46.09
1401	360	618.63	46.46

LAYNE-WESTERN COMPANY, INC. HYDROLOGY DIVISION PUMP TEST DATA

NAME: CITY OF ALBUQUERQUE

DATE: 4-17-1985

LOCATION: RIDGECREST

WELL NO.:

JOB NO.: D-699

RECOVERY DATA

TIME OF	ELAPSED TIME	TIME SINCE SHUT OFF	RATIO	WATER LEVEL	RESIDUAL DRAWDOWN
DAY	t,min	t', min	t/t'		ft
801	. O		0.00	572.17	0.00
1402	361	1	361.00	576.65	4.48
1403	362	. 2	181.00	576.25	4.08
1404	363	3	121.00	577.45	5.28
1405	364	4	91.00	582.80	10.63
1406	365	5	73.00	583.61	11.44
1408	367	7	52.43	583.26	11.09
1410	369	9	41.00	582.72	10.55
1412	371	11	33.73	582.21	10.04
1416	375	15	25.00	580.15	7.98
1421	380	20	19.00	580.14	7.97
1426	385	25	15.40	579.97	7.80
1431	390	30	13.00	579.42	7.25
1441	400	40	10.00	578.40	6.23
1451	410	50	8.20	577.91	5.74
1501	420	60	7.00	577.30	5.13
1511	430	70	6.14	576.97	4.80
1521	440	80	5.50	576.53	4.36
1531	450	90	5.00	576.25	4.08

NAME: CITY OF ALBUQUERQUE

DATE: 4-17-1985

LOCATION: KIRTLAND AFB WELL NO.: 5 - obs. JOB NO.: D-699

TIME OF DAY	ELAPSED TIME	WATER LEVEL	DRAWDOWN
801	O 1	550.71 550.66	0.00 -0.05
802	2	550.63	-0.08
808 803	ร์	550.63	-0.08
808	7	550.60	-0.11
810	9	550.54	-0.17
812	11	550.59	-0.12
816	15	550.58	-0.13
821	20	550.47	-0.24
826	25	550.47	-0.24
831	30	550.44	-0.27
836	35	550.43	-0.28
841	40	550.43	-0.28 -0.26
846	_. 45	550.45	-0.25
851	50	550.46	-0.21
856	55	550.50	-0.19
901	60	550.52 550.54	-0.17
906	65 70	550.56	-0.15
911	70	550.61	-0.10
916	75 80	550.65	-0.06
921	85	550.69	-0.02
926	90	550.72	0.01
931 937	95	550.73	0.02
936 946	105	550.80	0.09
740 951	110	550.82	0.11
1001	120	550.88	0.17
1011	130	550.94	0.23
1031	150	551.05	0.34
1101	180	551.20	0.49
1131	210	551.33	0.62
1201	240	551.41	0.70
1231	270	551.47	0.76
1301	300	551.59	0.88
1331	330	551.63	0.92
1356	355	551.74	1.03

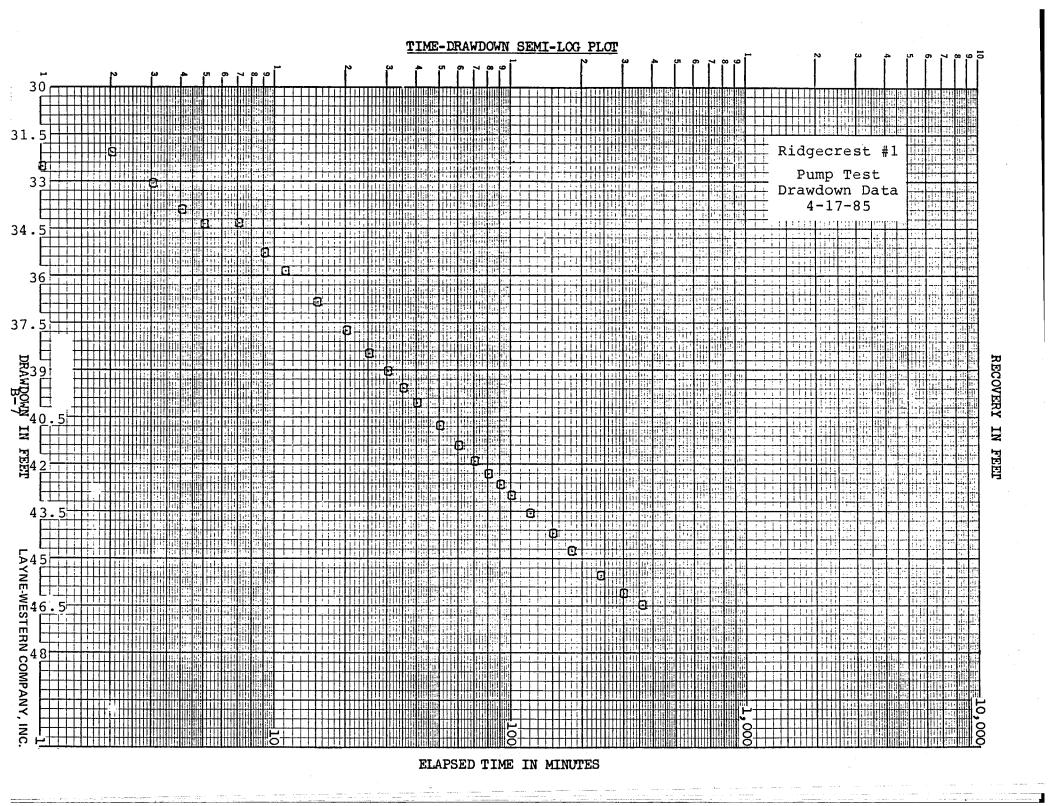
NAME: CITY OF ALBUQUERQUE

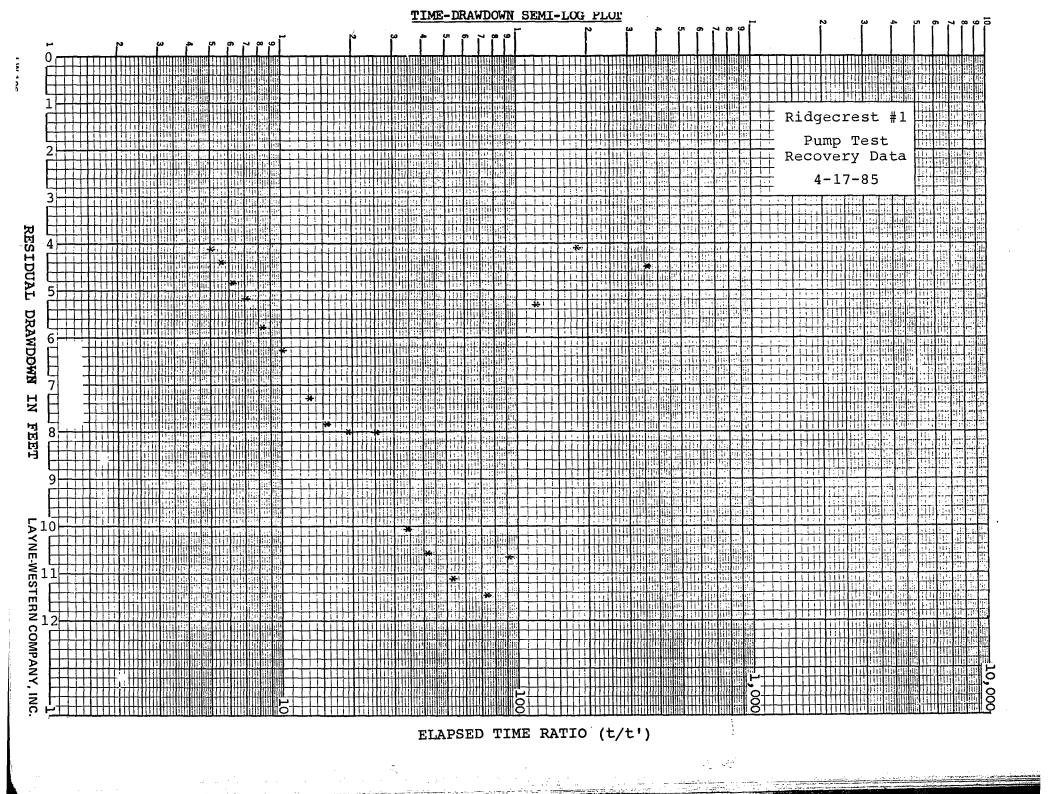
DATE: 4-17-1985

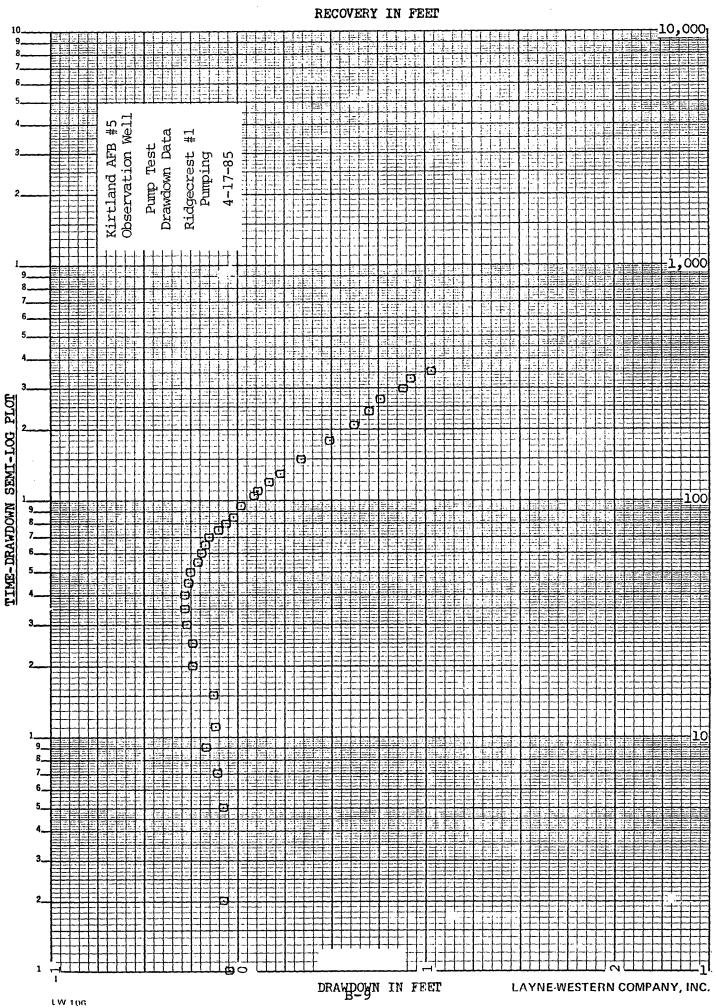
LOCATION: KIRTLAND AFB WELL NO.: 5 - obs. JOB NO.: D-699

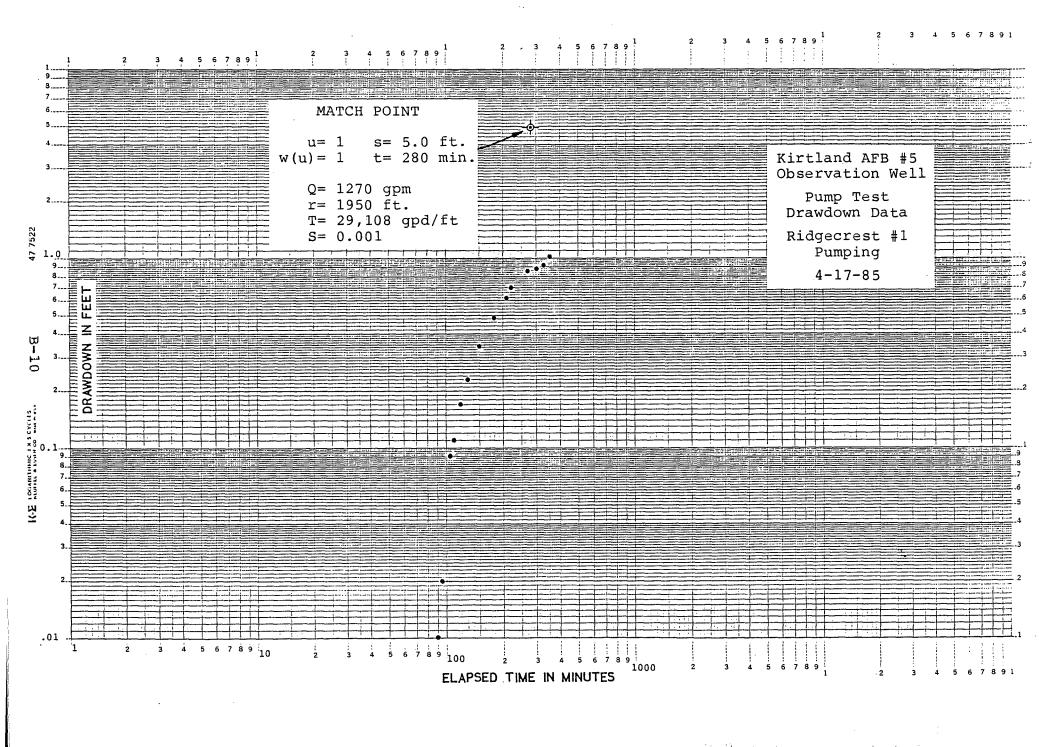
RECOVERY DATA

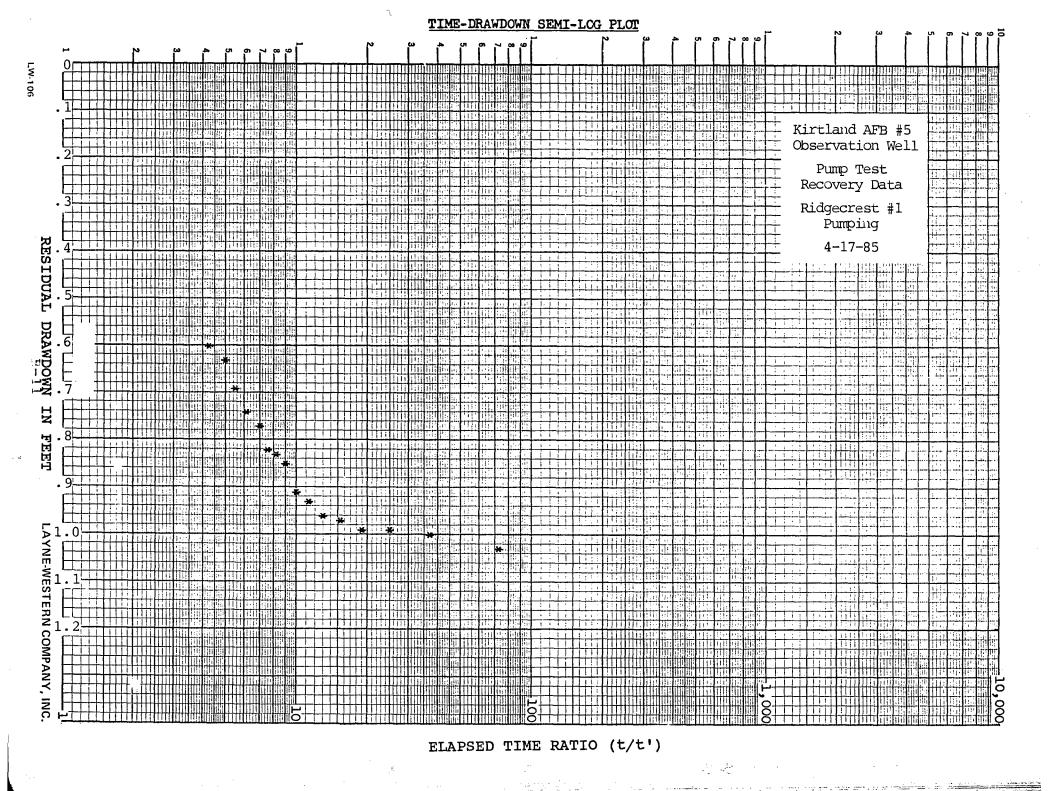
OF DAY TIME t,min SHUT OFF t',min LEVEL ft DRAWDOWN ft 801 0 0.00 550.71 0.00 1406 365 5 73.00 551.74 1.03 1411 370 10 37.00 551.71 1.00 1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00						
DAY t,min t',min t/t' ft 801 0 0.00 550.71 0.00 1406 365 5 73.00 551.74 1.03 1411 370 10 37.00 551.71 1.00 1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0	TIME			RATIO	WATER	RESIDUAL
801 0 0.00 550.71 0.00 1406 365 5 73.00 551.74 1.03 1411 370 10 37.00 551.71 1.00 1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.69 1531 450 90 5.50 551.34 <t< td=""><td>OF</td><td>TIME</td><td>SHUT OFF</td><td></td><td>LEVEL</td><td>DRAWDOWN</td></t<>	OF	TIME	SHUT OFF		LEVEL	DRAWDOWN
801 0 0.00 550.71 0.00 1406 365 5 73.00 551.74 1.03 1411 370 10 37.00 551.71 1.00 1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.69 1531 450 90 5.50 551.34 <t< td=""><td>DAY</td><td>t.min</td><td>t',min</td><td>t/t'</td><td></td><td>ft</td></t<>	DAY	t.min	t',min	t/t'		ft
1406 365 5 73.00 551.74 1.03 1411 370 10 37.00 551.71 1.00 1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.63		·	·			
1411 370 10 37.00 551.71 1.00 1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.34 0.63	801	O		0.00	550.71	0.00
1411 370 10 37.00 551.71 1.00 1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.34 0.63	1406	365	5	73.00	551.74	1.03
1416 375 15 25.00 551.70 0.99 1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.63 1531 450 90 5.50 551.34 0.63	1411	370	10		551.71	1.00
1421 380 20 19.00 551.70 0.99 1426 385 25 15.40 551.68 0.97 1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.69 1531 450 90 5.50 551.34 0.63	1416	375	15	25.00	551.70	
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1431 390 30 13.00 551.67 0.96 1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63						
1436 395 35 11.29 551.64 0.93 1441 400 40 10.00 551.62 0.91 1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1431					
1446 405 45 9.00 551.56 0.85 1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1436	395				
1451 410 50 8.20 551.54 0.83 1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1441	400	40	10.00	551.62	0.91
1456 415 55 7.55 551.53 0.82 1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1446	405	45	9.00	551.56	0.85
1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1451	410	50			
1501 420 60 7.00 551.48 0.77 1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1456	415	55	7.55	551.53	0.82
1511 430 70 6.14 551.45 0.74 1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1501	420	60	7.00		
1521 440 80 5.50 551.40 0.69 1531 450 90 5.00 551.34 0.63	1511	430				
1531 450 90 5.00 551.34 0.63		440			551.40	
1551 470 110 4.27 551.31 0.60	1551	470	110		551.31	i contract of the contract of











NAME: CITY OF ALBUQUERQUE DATE: 4-17-1985

LOCATION: RIDGECREST WELL NO.: 1 JOB NO.: D-699

PUMPING RATE, Q(gpm) = 1270

DISCHARGE PRESSURE(psi) = 13.0

(ft) = 30.0

PUMPING WATER LEVEL(ft) = 619.0

TOTAL HEAD, H(ft) = 649.0

WATER HORSEPOWER, WHP = QH/3960 = 208.1

ELECTRIC METER:

MULTIPLIER = 600

Kh = 1.8

REV/SEC = 0.070

INPUT HORSEPOWER, IHP = 4.826 * Kh * MULTIPLIER * REV/SEC IHP = 364.8

WIRE-TO-WATER EFFICIENCY(%) = WHP/IHF * 100 = 57.1

NAME: <u>CITY OF ALBUQUERQUE</u>

DATE: <u>4-17-1985</u>

LOCATION: RIDGECREST WELL NO.: 1 JOB NO.: D-679

PUMPING RATE, $\Omega(gpm) = 1270$

DISCHARGE PRESSURE(psi) = 13.0

(ft) = 30.0

DISCHARGE HEAD LOSS(ft) = 5.0

FUMPING WATER LEVEL(ft) = 619.0

TOTAL HEAD, H(ft) = 654.0

WATER HORSEPOWER, WHP = QH/3960 = 209.8

ELECTRIC METER:

MULTIFLIER = 600

⟨h

= 1.8

REV/SEC = 0.070

INPUT HORSEPOWER, IHP = 4.826 * Kh * MULTIPLIER * REV/SEC IHP = 364.8

OVERALL MECHANICAL EFFICIENCY(%) = WHP/IHP * 100 = 57.5

MOTOR: G.E.	PUMP M.F.G. JOHNSTON	Rated G.P.M. 1500
Model: 5K6325xC189A	Pump Setting 612.75+40'	Static Level
Type: K	No. of Stages 8	8/13/82 Pumping Level 593
NEMA C1. Design:	Bowl Size 14 BC	Impeller Sett.
Code: G	Bowl Ser.#	T.D.H. 626
Frame 6325 P24	Impeller Ser.#	Dia. of Casing 16" TD
Ser. # MAJ1215007	Pump Ser.# JX 2884	Total Depth 1254.5
н.р. 300	Impeller Dia.	Dia. of Discharge
F1. RPM 1775	Pump Curve Sheet No. 10345	Ft. of Tail Pipe /o'x
F1 AMPS 70	Pump Eff. When New	Strainer
Volts 2300	Dia. of 011 Tube	PERFOCATED 7632-1254
Cycle 60	Dia. of Line Shaft 1 5/16"	
Phase 3	Dia. of Column Pipe	
Rating Cour	Length of Column Pipe	
Rise 60°C	Length of Line Shaft	
Sero Factor	Length of Head Shaft	
Upper Bearing		
. Lower Searing RIOGECREST	WELL #1 600	ALTEZ SE.

DEALER: COE CONSTRUCTION REF. NO CUSTOMER: REF. NO O 850 AFIRCNED EXC 27 AS NOTED AFIRCNED EXC 27 AS NOTED TO 750 TO 750 GUNDUN HIS SOUTH REGULATION.	
CUSTOMER:	
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Z 700 GUNDUN HENCHEN KANNONAFA	+
Operating Point 4-17-85	7
	- H
DA E 1 C (G P P P P P P P P P P P P P P P P P P	
7 300 TDH = 654 ft	
	700
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	200
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	7600 3
THE CAPACITY, HEAD AND EFFICIENCY IMPELLER HR 7 DIA JOHNSTON PUMP CO. PERFORMANCE	
POINT ONLY: IT IS BASED ON SHOP	
WATER AT A TEMPERATURE OF NOT OVER 85° F. AND UNDER SUCTION CLOUIS WATER AT	TUESINE PUMP
CONTRACT. SATH YEAR 1909 1963	
BATT 7-7-6 TAY ATC PASADENA . CALIFORNIA . U.S.A	РМ ,

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WILSON LABORATORIES

P.O. BOX 1858 - 528 NORTH NINTH STREET, SALINA, KANSAS 913/925-7186

LAYNE-WESTERN COMPANY INC. - 2

ATTN: CARL NUZMAN 610 SOUTH 38TH

KANSAS CITY, KS 66106

SAMPLE: ALBUOUERQUE RIDGECREST WELL #1

WILSON LABS FILE NO.: 85-9540

REPORT DATE: 05/13/85

SAMPLE RECEIVED: 04/24/85 DATE SAMPLED: 04/17/85

TIME SAMPLED: 1055

LAB NO.: 85050202

GENTLEMEN:

ANALYTICAL QUALITY CHECKS HAVE BEEN PERFORMED ON THIS ANALYSIS TO ASSURE THAT NO SIGNIFICANT ERROR HAS OCCURRED. THE ION BALANCE HAS BEEN CALCULATED FROM THE LABORATORY ANALYSIS. THE ION BALANCE STANDARD DEVIATION, CALCULATED BY STANDARD METHODS PROCEDURE NUMBER 104C.1. (15TH ED.). IS SHOWN FOR YOUR INFORMATION. A STANDARD DEVIATION BETWEEN +/-1.0 IS NORMALLY ACCEPTABLE. AN ACTIVITY CORRECTION HAS BEEN APPLIED TO THE ION BALANCE BECAUSE THIS WATER CONTAINS SIGNIFICANT TOTAL DISSOLVED SOLIDS.

THE TOTAL IONIC STRENGTH OF THE WATER HAS ALSO BEEN CALCULATED BY THE COMPUTER. COMPUTATION OF TOTAL DISSOLVED SOLIDS HAS BEEN PERFORMED BASED ON THE CHEMICAL ANALYSIS CORRECTED FOR LOSS OF WATER AND CARBON DIOXIDE WHICH OCCURS UPON DRYING. THIS REPORTED TOTAL DISSOLVED SOLIDS VALUE IS COMPARABLE TO THAT WHICH WOULD BE OBTAINED BY STANDARD METHODS ANALYSIS NUMBER 2000. (15TH ED.)

TOTAL DISSOLVED SOLIDS CONCENTRATION EXCEEDS THE DESIRABLE LIMIT OF 250 Mg/L. BUT IS NOT HIGH ENOUGH TO BE OF CONCERN FOR MOST USES.

THIS IS A HARD WATER.

LOW HARDNESS FAVORS LAUNDRY AND MOST DOMESTIC AND INDUSTRIAL USES. HIGH HARDNESS FAVORS USE AS DRINKING WATER, SO LONG AS IT IS NOT EXCESSIVE.

NON-CARBONATE HARDNESS IS PRESENT. AS INDICATED BY THE EXCESS OF TOTAL HARDNESS OVER TOTAL ALKALINITY.

THIS WATER HAS A NORMAL PH FOR MOST PURPOSES.

THE SATURATION PH IS THE PH AT WHICH THE WATER IS JUST SATURATED WITH CALCIUM CARBONATE. ACCORDING TO STANDARD METHODS (15TH ED., PP57-GO). CALCIUM CARBONATE WILL NOT BE DISSOLVED OR PRECIPITATED WHEN THE WATER PH IS EQUAL TO THE SATURATION PH. IF THE WATER PH IS GREATER THAN THE SATURATION PH. A PROTECTIVE COATING OF CALCIUM CARBONATE WILL BE DEPOSITED ON THE PIPE WALLS. THE SATURATION PH IS CALCULATED WITH CORRECTIONS FOR TEMPERATURE AND SALINITY FROM THE EXPRESSION DEVELOPED BY LARSON AND BUSWELL (JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION, VOL.34, NO. 11.PG. 1676).

THE RYZNAR STABILITY INDEX IS AN INDICATOR OF THE SCALING OR CORROSIVE NATURE OF A WATER. ACCORDING TO STANDARD METHODS (14TH ED., PG. 50). A WATER BECOMES MORE SCALING AS THE STABILITY INDEX DECREASES FROM ABOUT 6.5. AS THE STABILITY INDEX INCREASES FROM 6.5. THE WATER BECOMES MORE CORROSIVE.

THE LANGELIER SATURATION INDEX IS CALCULATED AS THE WATER PH MINUS THE SATURATION PH. ACCORDING TO STANDARD METHODS (15TH ED., PP. 57-60), A SATURATION INDEX OF ZERO INDICATES CALCIUM CARBONATE EQUILIBRIUM, OR A STABLE WATER. A NEGATIVE SATURATION INDEX INDICATES A TENDENCY TO DISSOLVE CALCIUM CARBONATE. OR A CORROSIVE WATER. A POSITIVE VALUE INDICATES A TENDENCY TO DEPOSIT CALCIUM CARBONATE. OR A SCALING WATER.

THE STABILITY INDEX INDICATES THAT THIS WATER IS SLIGHTLY AGGRESSIVE AND MAY CAUSE MINOR CORROSION. CORRECTIVE TREATMENT IS SUGGESTED.

THE CALCULATED TOTAL FREE CARBON DIOXIDE VALUE IS THE CONCENTRATION OF CARBON DIOXIDE ACTUALLY PRESENT IN THE WATER. CALCIUM CARBONATE IN WATER EXISTS IN EQUILIBRIUM WITH CARBON DIOXIDE. A CERTAIN CONCENTRATION OF CARBON DIOXIDE MUST BE PRESENT TO PREVENT PRECIPITATION OF CALCIUM CARBONATE. THIS CALCULATED VALUE REQUIRED TO PREVENT SCALING IS LISTED AS THE NECESSARY FREE CARBON DIOXIDE. THE EXCESS CARBON DIOXIDE IS THE TOTAL FREE CARBON DIOXIDE MINUS THE NECESSARY FREE CARBON DIOXIDE. IF THE EXCESS CARBON DIOXIDE IS A NEGATIVE VALUE, SCALING OR DEPOSITION OF CALCIUM CARBONATE WILL PROBABLY OCCUR. IF THE EXCESS CARBON DIOXIDE IS A POSITIVE VALUE, THE WATER WILL TEND TO BE CORROSIVE OR AGGRESSIVE IN ITS ATTACK ON PIPING AND EQUIPMENT. THE PRESENCE OF POSITIVE OR NEGATIVE CARBON DIOXIDE IS NOT SIGNIFICANT FROM A HEALTH STANDPOINT.

WILSON LABORATORIES

m R Newromer

LYNN R. NEWCOMER CHIEF CHEMIST

WILSON LABORATORIES

STANDARD CHEMICAL WATER ANALYSIS

LAYNE-WESTERN COMPANY INC 2	REPORT DATE: 05/13/85
ATTN: CARL NUZNAN	DATE SAMPLED: 04/17/85
610 SOUTH 38TH	TIME SAMPLED: 1055
KANSAS CITY, KS 66106	FILE NO.: 85-9540
SAMPLE:ALBUQUERQUE RIDGECREST WELL #i	ORDER NO.: 9252
	LAB NO.: 85050202
	SAMPLE RECEIVED: 04/24/85

CATIONS					LABORATORY ANALYSIS
CALCIUM HYDROGEN IRON, TOTAL MAGNESIUM MANGANESE POTASSIUM SODIUM	CA+2 H+1 FE . MG+2 MN+2 K+1 NA+1	MG/L			54.00 0.00 0.00 5.00 0.00 2.60 38.00
ANIONS					
BICARBONATE CARBONATE CHLORIDE FLUORIDE HYDROXIDE NITRATE PHOSPHATE SULFATE	HC03-1 C03-2 CL-1 F-1 OH-1 N03-1 P04-3 S04-2	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L			177.15 0.17 9.00 0.50 0.01 3.98 0.00 51.00
CATION TOTAL ANION TOTAL ION BALANCE STANDARD DEVIAT	101	MEQ/L MEQ/L			4.83 4.32 0.51 -2.9403
SILICA TOTAL DISSOLVED TOTAL ALKALINIT CARBONATE ALKALINI CALCIUM ALKALINI MAGNESIUM ALKALINI TOTAL HARDNESS CALCIUM HARDNESS MAGNESIUM HARDN NON-CARBONATE H CALCIUM NON-CAR MAGNESIUM NON-CAR MAGNESIUM NON-C PH SATURATION PH STABILITY INDEX SATURATION INDEX	Y INITY INITY TY S ESS ARDNESS BONATE H ARBUNATE	AS AS AS AS AS AS AS ARDNESS	SIO2 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 UNITS UNITS UNITS	MG/L MG/L MG/L MG/L MG/L MG/L	28.02 279.46 146.00 145.74 134.84 10.91 0.00 155.42 134.84 20.58 9.67 0.00 9.67 7.50 7.54 7.57

LAYNE-WESTERN COMPANY INC 2	05/13/85	PAGE	2
TOTAL FREE CARBON DIOXIDE CO2 MG/L	8.34		
NECESSARY FREE CARBON DIOXIDE CO2 MG/L	7.66		
EXCESS CARBON DIOXIDE CO2 MG/L	0.68		
TEMPERATURE OF ANALYSIS FAHRENHEIT	77.00		
CONDUCTIVITY, MEASURED-0 250 MICROMHOS/CM	427.9	20	
CONDUCTIVITY, CALCULATED @ 25C MICROMHOS/CM	407.2	26	
IONIC STRENGTH MOL/L	0.0067		

CATION-ANION COMBINATIONS

				·		
į	CA		! MG !		NA	· 1KI
	······································		ت کا در بن بدر به به به بند بند در در در در در در در بند بند بند بند بند بند بند			
1		HC03		į	804	! CL !N!

ION ACTIVITIES ARE IN MEQ./L.

SCALE: ONE SPACE EQUALS 0.0539 MEQ/L.

LEGEND

CATIONS	WEQ/L
CALCIUM= CA	1.91
MAGNESIUM= MG	0.29
SODIUM- NA	1.52
POŢAŜĢIUM= K	0.06
ENOINA	
BICARBONATE= HCO3	2.66
SULFATE= 504	0.75
CHLORIDE= CL.	0.23
NITRATE= N	0.06



525 N. EIGHTH • P.O. BOX 1884 • SALINA, KANSAS 67402-1884 • (913) 825-7186

June 18, 1987

Groundwater Management, Inc.

610 S. 38th

Kansas City, KS 66106

Attn: Bret Overholtzer

Re: Standard Well Water Detection Limits

Wilson Laboratories File No. 87-9668

Dear Mr. Overholtzer:

Below are listed the standard detection limits for the standard well water parameters:

 $2 \text{ mg/l as } \text{CaCO}^3$ Alkalinity, total 2 mg/lChloride $0.1 \, \text{mg}/1$ Fluoride 0.1 mg/l as NNitrate/Nitrite Orthophosphate 0.1 mg/l as Pnot applicable рН 2 umhos/cm Specific Conductance 10 mg/lSulfate 2 mg/1Calcium Iron $0.1 \, \text{mg/l}$ Magnesium 2 mg/l

 Manganese
 0.02 mg/l

 Potassium
 2 mg/l

 Silicon
 1 mg/l

 Sodium
 5 mg/l

All other reported parameters are calculated from the above parameters. When the SWAN Fortran program reads in the values of the above parameters for input into the standard well water report, the Non-detected values are changed to the value 0.00.

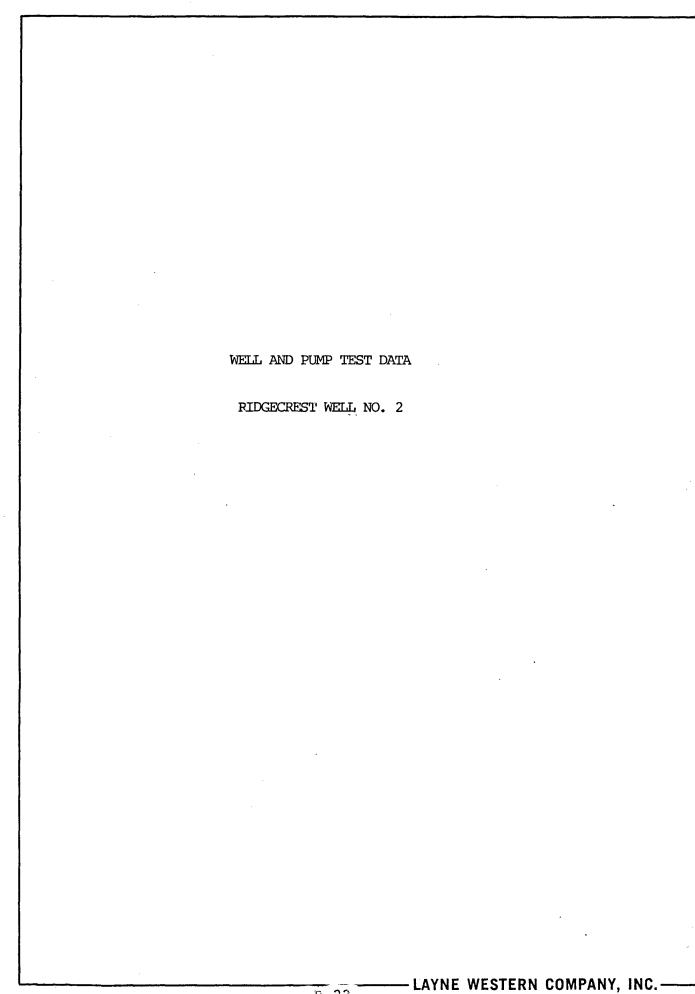
If you require any additional information, do not hesitate to call.

WILSON LABORATORIES

Sernadino Semens

Bernadine Siemens

bernadine Stemens



LW-25

WELL DATA SUMMARY SHEET

CITY OF ALBUQUERQUE RIDGECREST WELL NO. 2

DATE OF PUMP TEST: 4-10-1985 TEST DISCHARGE RATE (gpm): 3010 DISCHARGE PRESSURE (psi): 24 STATIC WATER 541 LEVEL (ft): WATER LEVEL MEASUREMENT METHOD: Air-line FUMP SETTING (ft): 680 CURRENT SPECIFIC 81 CAPACITY (gpm/ft): ORIGINAL SPECIFIC CAPACITY (gpm/ft) : 41 YEAR DRILLED : 1977 BOREHOLE DIAMETER (in) : 30 WELL DEPTH (ft): 1543 SCREEN TYPE : Roscoe Moss Shutter Screen SCREEN INTERVAL (ft): 730 - 1500

COMMENTS :

NAME: <u>CITY OF ALBUQUERQUE</u>

DATE: 4-10-1985

LOCATION: RIDGECREST WELL NO.: 2 JOB NO.: D-699

TIME OF DAY	ELAPSED TIME	WATER LEVEL	DRAWDOWN
930	0	541.40	0.00
931	i	567.40	26.00
932	2	568.00	26.60
933	3	569.10	27.70
934	4	569.70	28.30
935	5	570.30	28.90
937	7	571.40	30.00
939	9	572.00	30.60
941	11	572.60	31.20
945	15	573.20	31.80
950	20	573.70	32.30
1000	30	574.90	33.50
1005	35	575.50	34.10
1010	40	576.10	34.70
1020	50	576.10	34.70
1030	60	576.10	34.70
1.040	70	576.60	35.20
1050	80	577.20	35.80
1100	90	577.80	36.40
1110	100	577.80	36.40
1130	120	578.40	37.00
1200	150	578.40	37.00
1230	180	578.90	37.50
1300	210	578.9 0	37.50
1330	240	579.10	37.70
1430	300	579.50	38.10
1530	360	579.50	38.10
1640	430	580.10	38.70
1660	450	580.70	39.30

NAME: CITY OF ALBUQUERQUE

DATE: 4-10-1985

LOCATION: RIDGECREST

WELL NO.: 2

D-699 JOB NO.:

RECOVERY DATA

TIME OF	ELAPSED TIME	TIME SINCE SHUT OFF	RATIO	WATER LEVEL	RESIDUAL DRAWDOWN
DAY	t,min	t",min	t/t²		ft
930	O . 1		0.00	541.40	0.00
1701	451	1	451.00	541.40	0.00
1702	452	2	226.00	549.50	8.10
1703	453	3	151.00	549.50	8.10
1704	454	4	113.50	549.50	8.10
1705	455	5	91.00	548.90	7.50
1707	457	7	65.29	548.30	6.90
1709	459	9	51.00	548.30	6.90
1711	461	11	41.91	548.30	6.90
1715	465	15	31.00	547.80	6.40
1720	470	20	23.50	547.20	5.80
1725	475	25	19.00	546.60	5.20
1730	480	30	16.00	546.00	4.60
1735	485	35	13.86	546.00	4.60
1740	490	40	12.25	546.00	4.60
1750	500	50	10.00	546.00	4.60
1800	510	60	8.50	544.90	3.50
1810	520	70	7.43	544.50	3.10
1820	530	80	6.63	544.30	2.90
1830	540	90	6.00	543.70	2.30
1840	550	100	5.50	543.70	2.30

NAME: CITY OF ALBUQUERQUE DATE: 4-10-1985

LOCATION: RIDGECREST WELL NO.: 1 - obs. JOB NO.: D-699

TIME OF DAY	ELAPSED TIME	WATER LEVEL	DRAWDOWN
930	Ō	571.37	0.00
950	20	572.19	0.82
954	24	572.11	0.74
957	27	572.08	0.71
960	30	572.10	0.73
1005	35	572.11	0.74
1010	40	572.10	0.73
1015	45	572.10	0.73
1020	50	572.10	0.73
. 1030	60	572.25	0.88
1.035	65	572.24	0.87
1040	70	572.27	0.90
1045	75	572.26	0.89
1050	80	572.28	0.91
1100	90	572.29	0.92
1115	105	572.30	0.93
1155	145	572.33	0.96
1225	175	572.37	1.00
1.255	205	572.40	1.03
1325	235	572.42	1.05
1.355	265	572.44	1.07
1425	295	572.45	1.08
1.455	325	572.45	1.08
1555	385	572.46	1.09
1645	435	572.45	1.08

NAME: <u>CITY OF ALBUQUERQUE</u> DATE: <u>4-10-1985</u>

LOCATION: RIDGECREST WELL NO.: 1 - obs. JOB NO.: D-679

RECOVERY DATA

TIME OF DAY	ELAFSED TIME t,min	TIME SINCE SHUT OFF t',min	RATIO t/t'	WATER LEVEL	RESIDUAL DRAWDOWN ft
930	0	:	0.00	571.37	0.00
1740	490	40	12.25	572.39	1.02
1745	495	45	11.00	572.36	0.99
1750	500	50	10.00	572.38	1.01
1755	505	55	9.18	572.32	0.95
1760	510	60	8.50	572.28	0.91
1805	515	65	7,92	572.27	0.90
1810	520	70	7.43	572.26	0.89
1820	- 530	80	6.63	572.24	0.87
1830	540	90	6.00	572.19	0.82

NAME: <u>CITY OF ALBUQUERQUE</u> DATE: <u>4-10-1985</u>

LOCATION: LOVE WELL NO.: 5 - obs. JOB NO.: D-699

TIME OF DAY	ELAFSED TIME	WATER LEVEL	DRAWDOWN
930	0	520.05	0.00
931	1	520.04	-0.01
932	2	520.04	-0.01
933	3	520.04	-0.01
934	4	520.04	-0.01
935	5	520.04	-0.01
937	7	520.03	-0.02
939	9	520.04	-0.01
941	11	520.04	-0.01
945	15	520.04	-0.01
950	20	520.05	0.00
955	25	520.06	0.01
1000	30	520.10	0.05
1005	35	520.13	0.08
1010	40	520.16	0.11
1015	45	520.20	0.15
1020	50	520.26	0.21
1030	60	520.33	0.28
1040	70	520.42	0.37
1050	80	520.52	0.47
1100	90	520.59	0.54
1130	120	520.83	0.78
1200	150	520.90	0.85
1230	180	521.01	0.96
1300	210	521.25	1.20
1330	240	521.41	1.36
1400	270	521.54	1.49
1430	300	521.66	1.61
1500	330	521.76	1.71
1600	390	521.94	1.89
1655	445	522.07	2.02

NAME: <u>CITY OF ALBUQUERQUE</u>

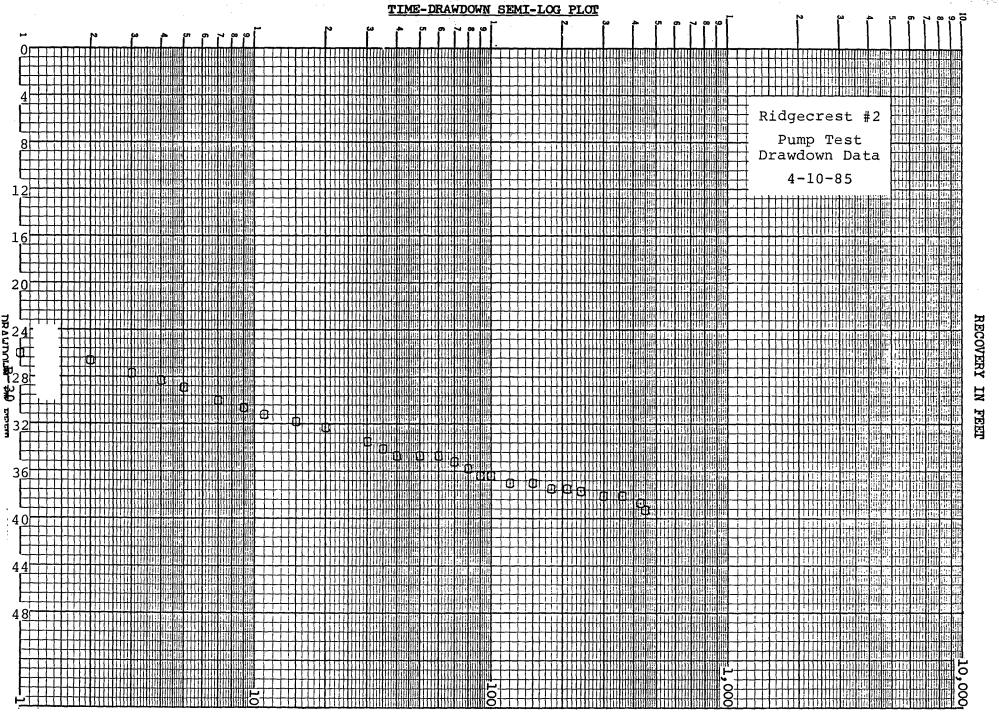
DATE: 4-10-1985

LOCATION: LOVE

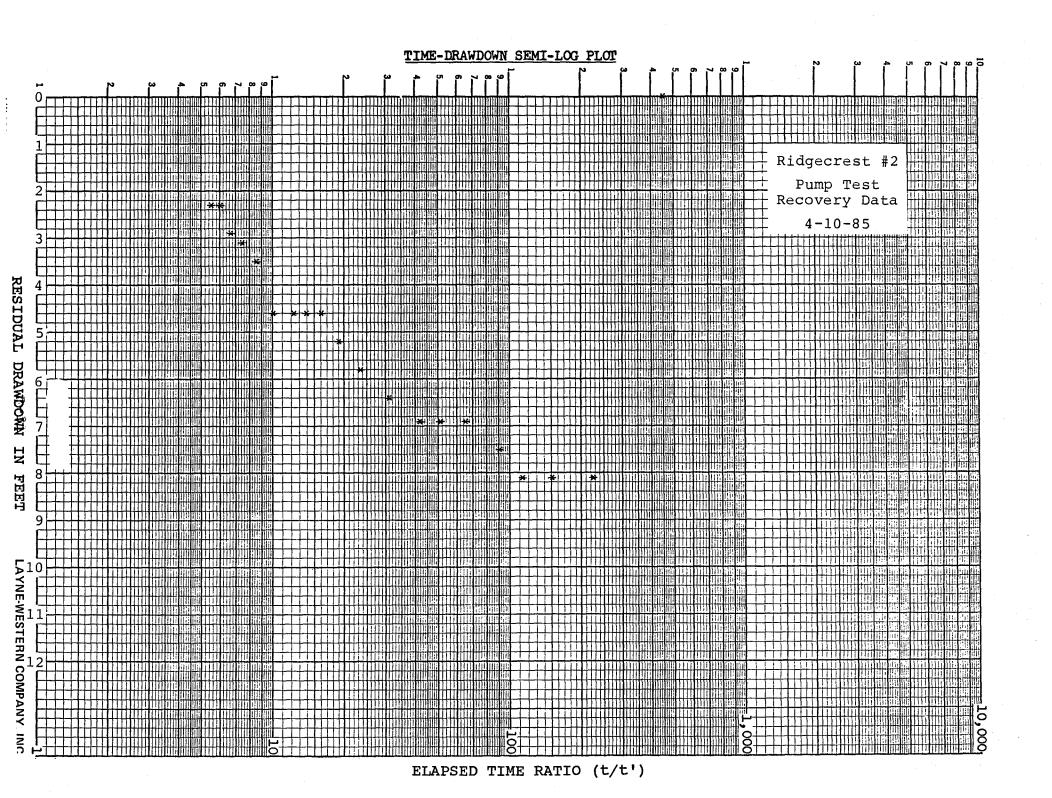
WELL NO.: 5 - obs. JOB NO.: D-679

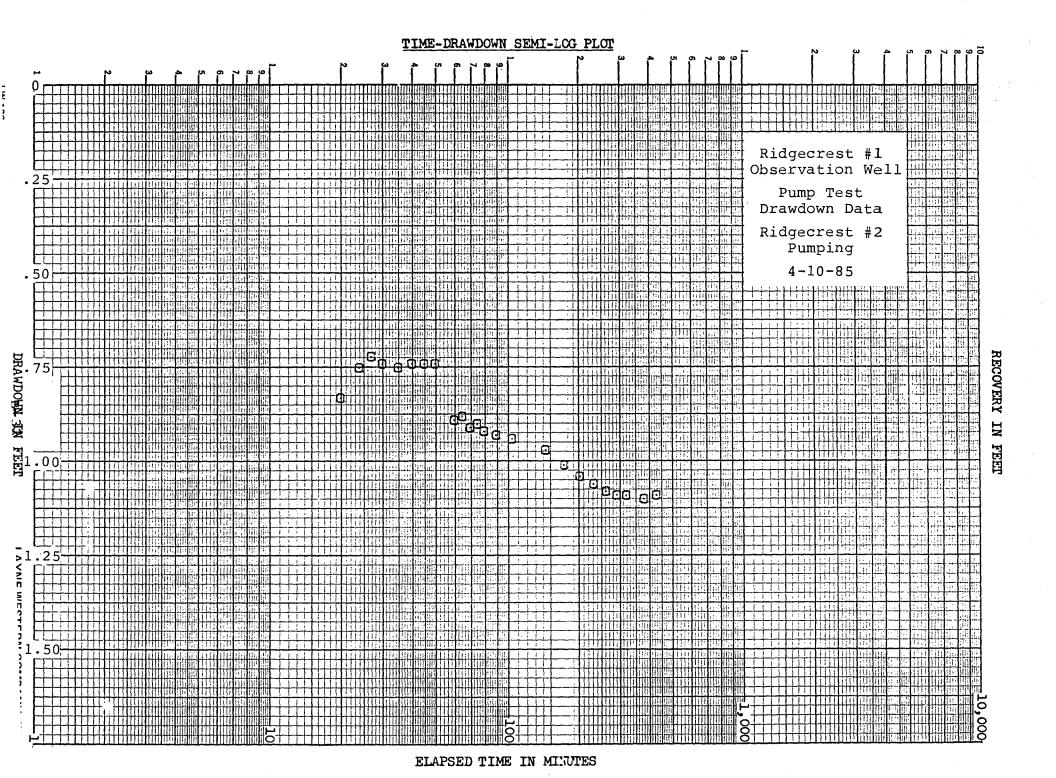
RECOVERY DATA

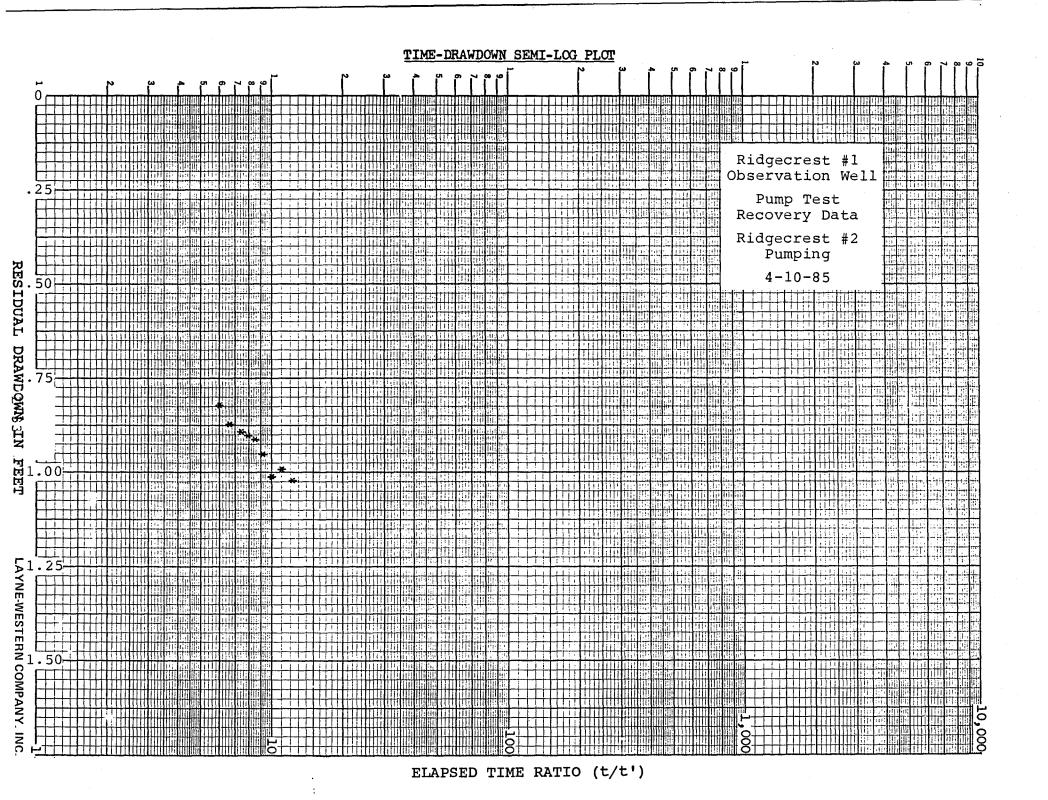
TIME OF DAY	ELAPSED TIME t,min	TIME SINCE SHUT OFF t',min	RATIO t/t'	WATER LEVEL	RESIDUAL DRAWDOWN ft
930 1701 1702 1703 1705 1707 1709 1711 1715 1720 1725 1730 1735 1740 1745 1750	0 451 452 453 455 457 459 461 465 470 475 480 490 490 500	1 2 3 5 7 9 11 15 20 25 35 40 45 50	0.00 451.00 226.00 151.00 91.00 65.29 51.00 41.91 31.00 23.50 19.00 16.00 13.86 12.25 11.00 10.00	520.05 522.09 522.08 522.09 522.10 522.09 522.10 522.09 522.00 522.07 522.07 522.01 521.98 521.96	0.00 2.04 2.03 2.03 2.04 2.05 2.04 2.05 2.04 2.05 2.00 1.96 1.93 1.91
1800 1810 1820 1830	510 520 530 540	60 70 80 90	8.50 7.43 6.63 6.00	521.90 521.83 521.77 521.71	1.85 1.78 1.72 1.66

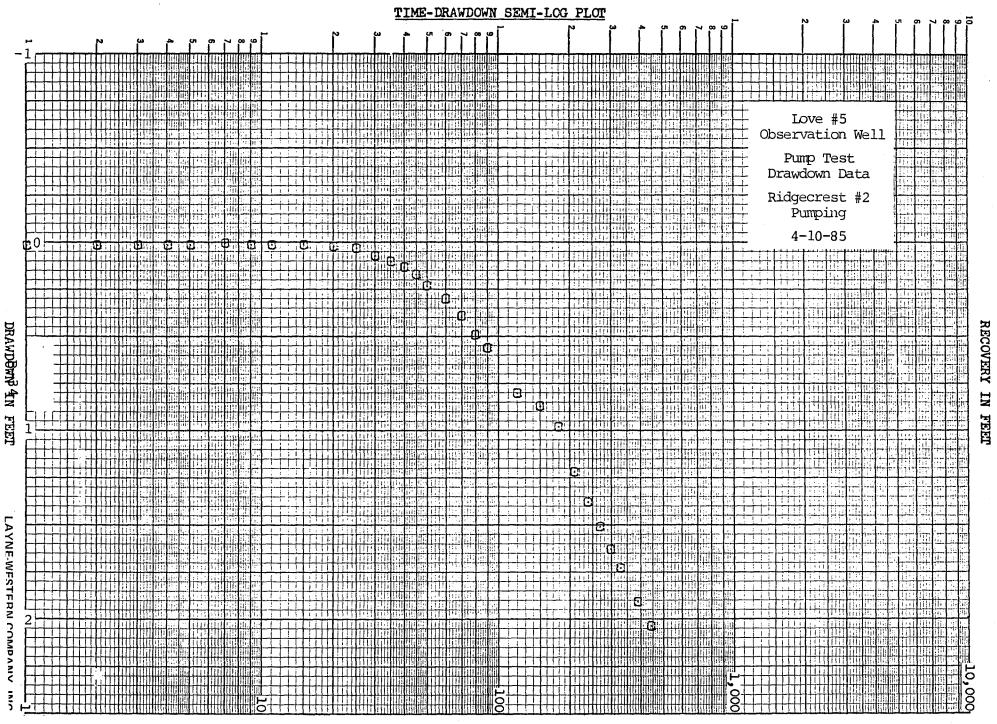


ELAPSED TIME IN MINUTES

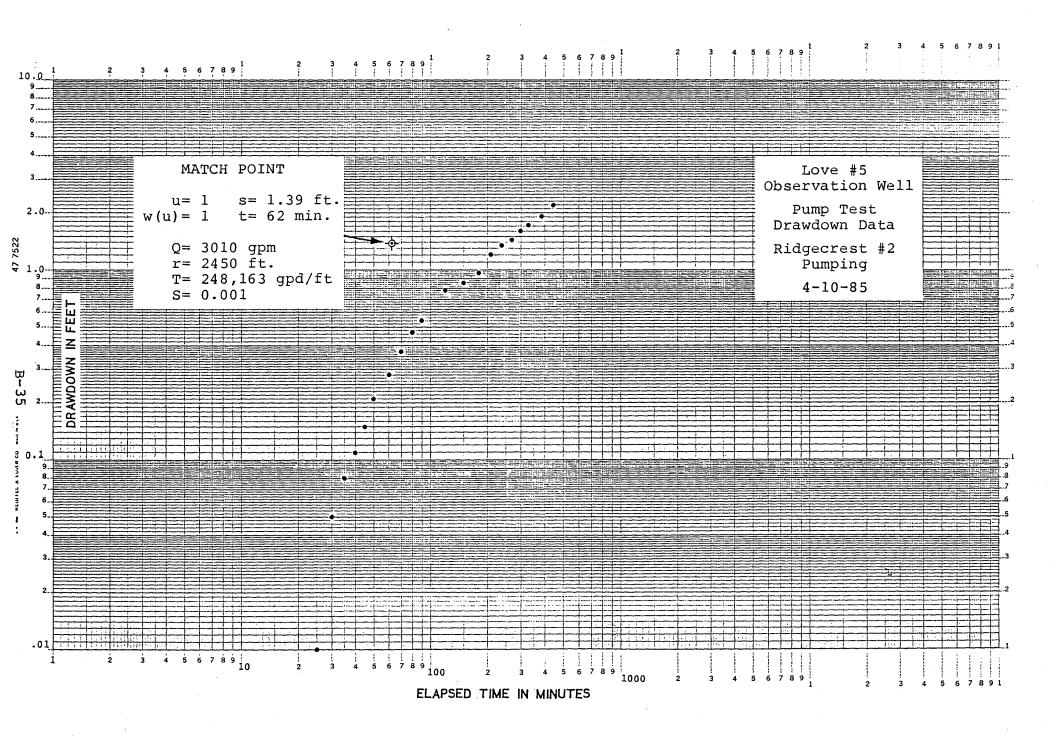


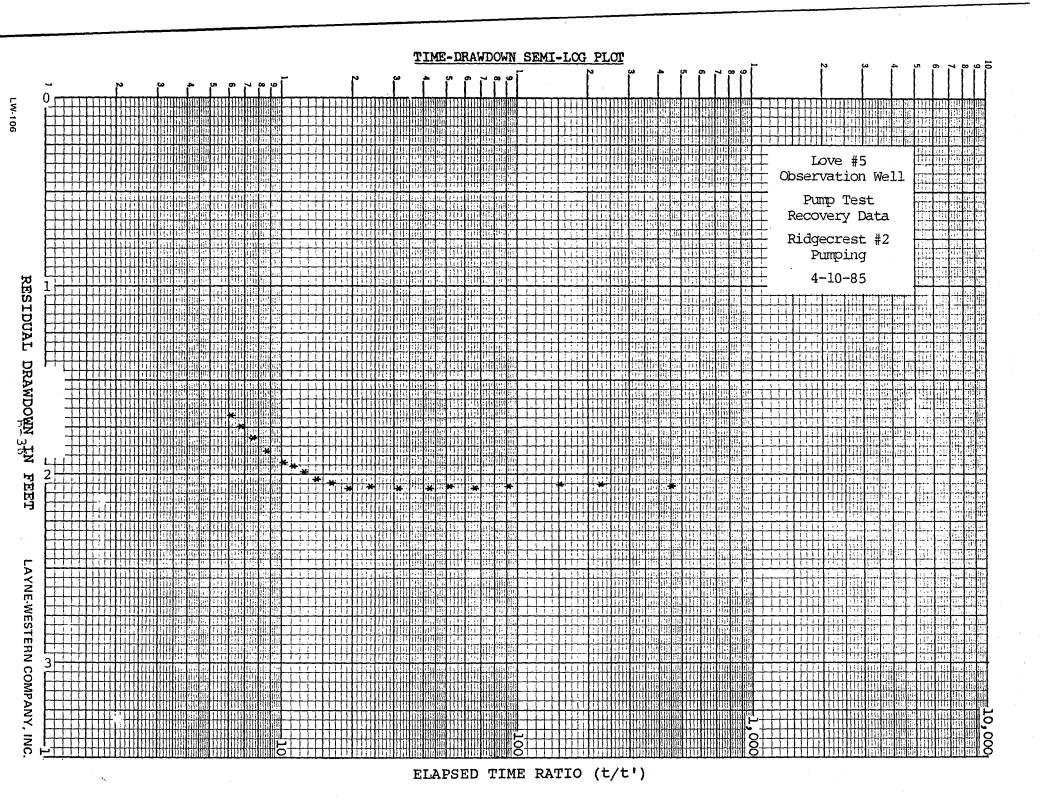






ELAPSED TIME IN MINUTES





CITY OF ALBUQUERQUE NAME:

DATE: 4-10-1985

LOCATION: RIDGECREST WELL NO.: 2

JOB NO.: D-699

PUMPING RATE, Q(gpm) = 3010

DISCHARGE PRESSURE(psi) = 24.0

(ft) = 55.4

PUMPING WATER LEVEL(ft) = 580.0

TOTAL HEAD, H(ft) = 635.4

WATER HORSEPOWER, WHP = $\Omega H/3960$ = 483.0

ELECTRIC METER:

MULTIPLIER = 600

= 1.8 Kh

REV/SEC = 0.143

INFUT HORSEPOWER, IHP = 4.826 * Kh * MULTIPLIER * REV/SEC IHP = 745.3

WIRE-TO-WATER EFFICIENCY(%) = WHP/IHP * 100 = 64.8

E: CITY OF ALBUQUERQUE

DATE: 4-10-1985

CATION: RIDGECREST

WELL NO.: 2

JOB NO.: <u>D-679</u>

PUMPING RATE, Q(gpm) = 3010

DISCHARGE PRESSURE(psi) = 24.0

(ft) = 55.4

DISCHARGE HEAD LOSS(ft) = 27.0

PUMPING WATER LEVEL (ft) = 580.0

TOTAL HEAD, H(ft) = 662.4

WATER HORSEPOWER, WHP = QH/3960 = 503.5

ELECTRIC METER:

MULTIPLIER = 600

 $\mathbb{K}h$

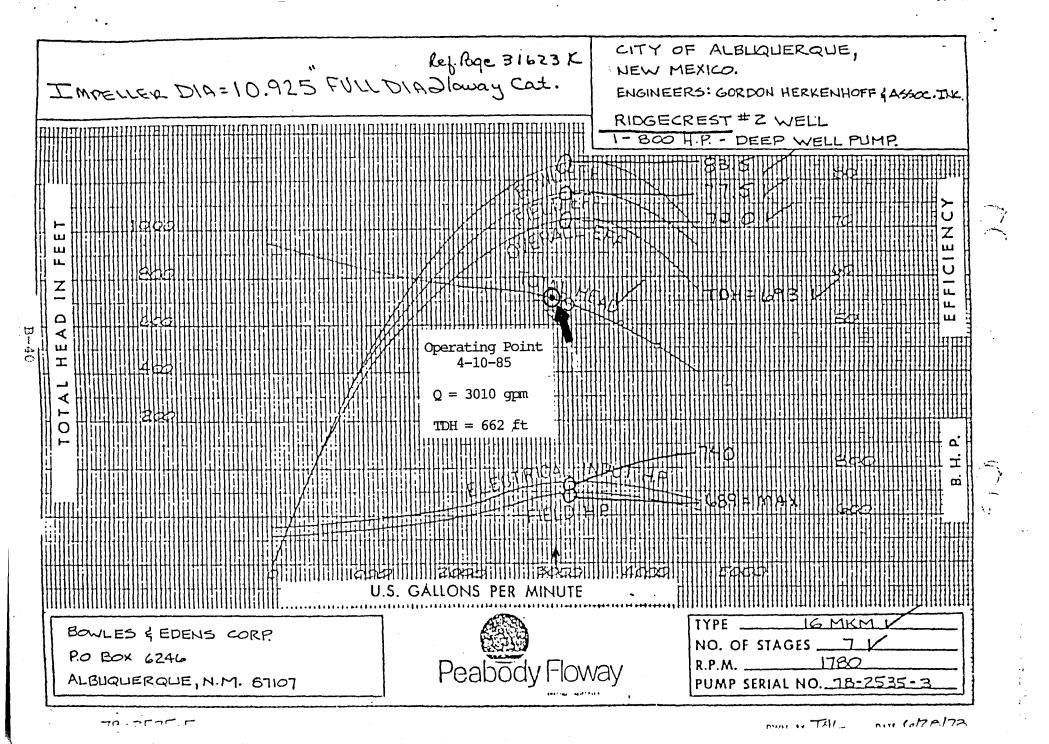
= 1.8

REV/SEC = 0.143

INPUT HORSEPOWER, IHP = 4.826 * Kh * MULTIPLIER * REV/SEC IHP = 745.3

OVERALL MECHANICAL EFFICIENCY(%) = WHF/IHP * 100 = 67.6

10TOR: GENERAL ELECTRIC	PUMP M.F.G. Floway	Rated G.P.M. 3200
10de1: 5K6338xC126A	Pump Setting 680'	Static Level
Type: VHS	No. of Stages 7	Pumping Level
ICMA C1. Design:	Bowl Size 16'MKM	Impeller Sett.
Code:	Bowl Ser.# CL 35 CIE.	T.D.II. 662'
rame 6338P30	Impeller Ser.# 16MKM	Dia. of Casing
jer.# ARJ 110017	Pump Ser.# 78-2535-3	Total Depth
I.P. 800	Impeller Dia.	Dia. of Discharge 12"
1. RPM 1775	Pump Curve Sheet No.	Ft. of Tail Pipe 10 of 16
1 AMPS 99.5	Pump Eff. When New	Strainer YES
101ts 4160	Dia. of 011 Tube 3/2"	
ycle 60	Dia. of Line Shaft 21/4"	
hase 3	Dia. of Column Pipe 12"	
lating K	Length of Column Pipe 20	•
lise 80°C AMP 40°C	Length of Line Shaft 20'	
ero Factor 1.15	Length of Head Shaft 78 /2"	
pper Bearing		
ower Searing		
TATION: RTOGECREST W	EU # 2 125 GEN	DERAL -PATCH INE



P.O. BOX 1858 - 528 NORTH NINTH STREET, SALINA, KANSAS 913/825-7186

LAYNE-WESTERN COMPANY INC. - 2
ATTN: CARL NUZMAN
G10 SOUTH 38TH
KANSAS CITY, KS G6106
SAMPLE:ALBUOUEROUE RIDGECREST WELL \$2

REPORT DATE: 05/13/85

SAMPLE RECEIVED: 04/24/85
DATE SAMPLED: 04/17/85
TIME SAMPLED: NOT GIVEN

WILSON LABS FILE NO.: 85-9540

LAB NO.: 85050203

GENTLEMEN:

ANALYTICAL QUALITY CHECKS HAVE BEEN PERFORMED ON THIS ANALYSIS TO ASSURE THAT NO SIGNIFICANT ERROR HAS OCCURRED. THE ION BALANCE HAS BEEN CALCULATED FROM THE LABORATORY ANALYSIS. THE ION BALANCE STANDARD DEVIATION. CALCULATED BY STANDARD METHODS PROCEDURE NUMBER 104C.1. (15TH ED.). IS SHOWN FOR YOUR INFORMATION. A STANDARD DEVIATION BETWEEN +/-1.0 IS NORMALLY ACCEPTABLE. AN ACTIVITY CORRECTION HAS BEEN APPLIED TO THE ION BALANCE BECAUSE THIS WATER CONTAINS SIGNIFICANT TOTAL DISSOLVED SOLIDS.

THE TOTAL TONIC STRENGTH OF THE WATER HAS ALSO BEEN CALCULATED BY THE COMPUTER. COMPUTATION OF TOTAL DISSOLVED SOLIDS HAS BEEN PERFORMED BASED ON THE CHEMICAL ANALYSIS CORRECTED FOR LOSS OF WATER AND CARBON DIOXIDE WHICH OCCURS UPON DRYING. THIS REPORTED TOTAL DISSOLVED SOLIDS VALUE IS COMPARABLE TO THAT WHICH WOULD BE OBTAINED BY STANDARD METHODS ANALYSIS NUMBER 209B. (15TH ED.)

TOTAL DISSOLVED SOLIDS CONCENTRATION OF THE WATER IS LOW.

THIS IS A MODERATELY HARD WATER.

LOW HARDNESS FAVORS LAUNDRY AND MOST DOMESTIC AND INDUSTRIAL USES. HIGH HARDNESS FAVORS USE AS DRINKING WATER, SO LONG AS IT IS NOT EXCESSIVE.

THIS WATER HAS A NORMAL PH FOR MOST PURPOSES.

THE SATURATION PH IS THE PH AT WHICH THE WATER IS JUST SATURATED WITH CALCIUM CARBONATE. ACCORDING TO STANDARD METHODS (15TH ED., PP57-60). CALCIUM CARBONATE WILL NOT BE DISSOLVED OR PRECIPITATED WHEN THE WATER PH IS EQUAL TO THE SATURATION PH. IF THE WATER PH IS GREATER THAN THE SATURATION PH. A PROTECTIVE COATING OF CALCIUM CARBONATE WILL BE DEPOSITED ON THE PIPE WALLS. THE SATURATION PH IS CALCULATED WITH CORRECTIONS FOR TEMPERATURE AND SALINITY FROM THE EXPRESSION DEVELOPED BY LARSON AND BUSWELL (JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION. VOL.34, NO. 11,PG. 1676).

THE RYZNAR STABILITY INDEX IS AN INDICATOR OF THE SCALING OR CORROSIVE NATURE OF A WATER. ACCORDING TO STANDARD METHODS (14TH ED.. PG. 50). A WATER BECOMES MORE SCALING AS THE STABILITY INDEX DECREASES FROM ABOUT G.S. AS THE STABILITY INDEX INCREASES FROM G.S. THE WATER BECOMES MORE CORROSIVE.

THE LANGELIER SATURATION INDEX IS CALCULATED AS THE WATER PH MINUS THE SATURATION PH. ACCORDING TO STANDARD METHODS (15TH ED., PP. 57-60), A SATURATION INDEX OF ZERO INDICATES CALCIUM CARBONATE EQUILIBRIUM, OR A STABLE WATER. A NEGATIVE SATURATION INDEX INDICATES A TENDENCY TO DISSOLVE CALCIUM CARBONATE. OR A CORROSIVE WATER. A POSITIVE VALUE INDICATES A TENDENCY TO DEPOSIT CALCIUM CARBONATE. OR A SCALING WATER.

THE STABILITY INDEX INDICATES THAT THIS WATER IS CORROSIVE AND MAY CAUSE CONSIDERABLE ATTACK ON METAL PIPING. CORRECTIVE TREATMENT IS HIGHLY DESIRABLE.

THE CALCULATED TOTAL FREE CARBON DIOXIDE VALUE IS THE CONCENTRATION OF CARBON DIOXIDE ACTUALLY PRESENT IN THE WATER. CALCIUM CARBONATE IN WATER EXISTS IN EQUILIBRIUM WITH CARBON DIOXIDE. A CERTAIN CONCENTRATION OF CARBON DIOXIDE MUST BE PRESENT TO PREVENT PRECIPITATION OF CALCIUM CARBONATE. THIS CALCULATED VALUE REQUIRED TO PREVENT SCALING IS LISTED AS THE NECESSARY FREE CARBON DIOXIDE. THE EXCESS CARBON DIOXIDE IS THE TOTAL FREE CARBON DIOXIDE MINUS THE NECESSARY FREE CARBON DIOXIDE. IF THE EXCESS CARBON DIOXIDE IS A NEGATIVE VALUE, SCALING OR DEPOSITION OF CALCIUM CARBONATE WILL PROBABLY OCCUR. IF THE EXCESS CARBON DIOXIDE IS A POSITIVE VALUE. THE WATER WILL TEND TO BE CORROSIVE OR AGGRESSIVE IN ITS ATTACK ON PIPING AND EQUIPMENT. THE PRESENCE OF POSITIVE OR NEGATIVE CARBON DIOXIDE IS NOT SIGNIFICANT FROM A HEALTH STANDPOINT.

WILSON LABORATORIES

m a Newromer

LYNN R. NEWCOMER CHIEF CHEMIST

STANDARD CHEMICAL WATER ANALYSIS

LAYNE-WESTERN COMPANY INC. - 2

ATTN: CARL NUZMAN

G10 SOUTH 38TH

KANSAS CITY, KS GGIGG

CAMPULE AND DEPOSIT BELL #2

GREEN NO.: 85-9540

GREEN NO.: 8752

SAMPLE:ALBUQUERQUE RIDGECREST WELL #2 ORDER NO.: 9252 LAB NO.: 85050203

SAMPLE RECEIVED: 04/24/85

					SAMPLE RELET
CATIONS					LABORATORY ANALYSIS
	CA+2 H+1 FE MG+2 MN+2 K+1 NA+1	MG/L MG/L MG/L MG/L MG/L MG/L MG/L			34.00 0.00 0.00 0.00 0.00 3.00 38.00
ANIONS					
CARBONATE CHLORIDE FLUORIDE HYDROXIDE NITRATE		MG/L MG/L MG/L MG/L MG/L			111.32 0.12 31.00 0.50 0.01 0.00 0.00 20.00
CATION TOTAL ANION TOTAL ION BALANCE STANDARD DEVIAT	NOI	MEQ/L MEQ/L MEQ/L			3.43 3.15 0.28 -1.8037
SILICA TOTAL DISSOLVED TOTAL ALKALINIT CARBONATE ALKAL CALCIUM ALKALIN MAGNESIUM ALKAL SODIUM ALKALINI TOTAL HARDNESS CALCIUM HARDNES MAGNESIUM HARDN NON-CARBONATE H CALCIUM NON-CAR MAGNESIUM NON-CAR MAGNESIUM NON-CAR SATURATION INDEX SATURATION INDEX	Y INITY INITY INITY TY S ESS ARDNESS BONATE H ARBONATE	AS AS AS AS AS AS AS AS	CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 UNITS UNITS UNITS	MG/L MG/L MG/L MG/L MG/L MG/L MG/L	29.52 210.95 92.00 91.66 84.90 0.00 6.76 84.90 0.00 0.00 0.00 7.60 7.92 8.24 -0.32

TOTAL FREE CARBON DIOXIDE CO2 MG/L 4.23 NECESSARY FREE CARBON DIOXIDE CO2 MG/L 2.02 EXCESS CARBON DIOXIDE CO2 MG/L 2.21 TEMPERATURE OF ANALYSIS FAHRENHEIT 77.00 CONDUCTIVITY, MEASURED @ 25C MICROMHOS/CM 349.00 CONDUCTIVITY, CALCULATED @ 25C MICROMHOS/CM 319.40 IONIC STRENGTH MOL/L 0.0043	LAINE-WESTERN CUMPANT INC 2			V07 137 60	THUE A	<u>:</u>
EXCESS CARBON DIOXIDE CO2 MG/L 2.21 TEMPERATURE OF ANALYSIS FAHRENHEIT 77.00 CONDUCTIVITY, MEASURED @ 25C MICROMHOS/CM 349.00 CONDUCTIVITY, CALCULATED @ 25C MICROMHOS/CM 319.40	TOTAL FREE CARBON DIOXIDE	C 02	MG/L	4.23		
TEMPERATURE OF ANALYSIS FAHRENHEIT 77.00 CONDUCTIVITY, MEASURED @ 25C MICROMHOS/CM 349.00 CONDUCTIVITY, CALCULATED @ 25C MICROMHOS/CM 319.40	NECESSARY FREE CARBON DIOXIDE	C02	MG/L	2.02		
CONDUCTIVITY, MEASURED @ 25C MICROMHOS/CM 349.00 CONDUCTIVITY, CALCULATED @ 25C MICROMHOS/CM 319.40						
CONDUCTIVITY, CALCULATED @ 25C MICROMHOS/CM 319.40	TEMPERATURE OF ANALYSIS FAHR	ENHEIT		77.00		
	CONDUCTIVITY. MEASURED @ 250	MICROMH	08/CM	349	.00	
TONIC STRENGTH MOLVE 0.0043	CONDUCTIVITY, CALCULATED @ 250	WICKOWH	OS/CM	310	.40	
THE REPORT OF THE PROPERTY OF	IONIC STRENGTH		MOL/L	0.0043		

ATION-ANION COMBINATIONS

	CA	!		NA		!K!
 ,	HC03		! 50	D4 !	CL	!

ON ACTIVITIES ARE IN MEQ/L.

CALE: ONE SPACE EQUALS 0.0412 MEQ/L.

EGEND

CATIONS	WEG/L
CALCIUM= CA	1.28
SODIUM= NA	1.54
POTASSIUM= K	0.07
ANIONS	
BICARBONATE= HCO3	1.70
SULFATE= SO4	0.31
CHLORTOF= CL	0.81



N. EIGHTH • P.O. BOX 1884 • SALINA, KANSAS 67402-1884 • (913) 825-7186

June 18, 1987

Groundwater Management, Inc.

610 S. 38th

Kansas City, KS 66106

Attn: Bret Overholtzer

Re: Standard Well Water Detection Limits

Wilson Laboratories File No. 87-9668

Dear Mr. Overholtzer:

Below are listed the standard detection limits for the standard well water parameters:

Alkalinity, total

Chloride

Fluoride

Nitrate/Nitrite

Orthophosphate

рH

Specific Conductance

Sulfate

Calcium

Iron

Magnesium

Manganese

Potassium

Silicon

Sodium

 $2 \text{ mg/l as } \text{CaCO}^3$

2 mg/1

 $0.1 \, \text{mg/l}$

0.1 mg/l as N

0.1 mg/l as P

not applicable

2 umhos/cm

10 mg/l

2 mg/1

0.1 mg/l

2 mg/1

0.02 mg/1

2 mg/1

1 mg/1

5 mg/l

All other reported parameters are calculated from the above parameters. When the SWAN Fortran program reads in the values of the above parameters for input into the standard well water report, the Non-detected values are changed to the value 0.00.

If you require any additional information, do not hesitate to call.

WILSON LABORATORIES

Delmadine Siemens

WELL AND PUMPING TEST DATA RIDGECREST 3

WELL DATA SUMMARY SHEET

CITY OF ALBUQUERQUE RIDGECREST WELL NO. 3

DATE OF PUMP TEST: 2-21-87

TEST DISCHARGE

RATE (gpm): 2890

DISCHARGE

PRESSURE (psi): 37

STATIC WATER

LEVEL (ft): 510 4

WATER LEVEL

MEASUREMENT METHOD: M-Scope

PUMP SETTING (ft): 660

CURRENT SPECIFIC

CAPACITY (gpm/ft): 90

ORIGINAL SPECIFIC

CAPACITY (gpm/ft): 75.0

YEAR DRILLED: 1974

BOREHOLE

DIAMETER (in):

WELL DEPTH (ft): 1475

SCREEN TYPE:

SCREEN INTERVAL (ft): 620.5-1436

COMMENTS:

WELL TESTED: RIDGECREST #3

DATE OF TEST: 2/21/87
OPERATOR: DAVID KILLEN

	E C E D A D I N ELAPSED			WATER LEVEL BELOW	
TIME OF DAY			CUT/ADD (+/- ft)	MEAS. PT.	
745 755 805	0 10 20	510 510 510	1.19 1.13 1.10	511.10	
815 825 835 845	30 40 50 60	510 510 510 510	1.00 0.90 0.77 0.75	510.77	
855 905 1024	70 80 159	510 510 510	0.85 0.85 0.45	510.85 510.85	
D R	A W D O	w n			
FLOW RATE (g	_	2890		WATER LEVEL BELOW	
TIME OF DAY	ELAPSED TIME	HOLDING (ft)	CUT/ADD (+/- ft)	MEAS. PT. (ft)	DRAWDOWN (ft)
1031	SWL	510	0.45	510.45	02.64
1032 1033	1 2	535 535	-0.91	534.09 534.60	23.64 24.15
1034	3	535	0.15	535.15	24.70
1035	4	535	0.95	535.95	25.50
1036 1038	5 7	535 535	1.21 1.88	536.21 536.88	25.76 26.43
1040	9	535	2.37	537.37	26.43
1042	11	540	-2.21	537.79	27.34
1046	15	540	-1.53	538.47	28.02
1051	20	540	-1.08 -0.68	538.92 539.32	28.47 28.87
1056 1101	25 30	540 540	0.08	540.08	29.63
1106	35	540	0.15	540.15	29.70
1111	40	540	0.40	540.40	29.95
1116 1121	45 50	540 540	0.63 0.85	540.63 540.85	30.18 30.40
1131	60	540	1.05	541.05	30.40
1141	70	540	1.35	541.35	30.90
1151	80	540	1.41	541.41	30.96
1201	90	540 540	1.45	541.45 541.86	31.00 31.41
1211 1231	100 120	540 540	1.86 2.27	542.27	31.41
1301	150	540	2.55	542.55	32.10
1331	180	545	-2.36	542.64	32.19
1351	200	545	-2.20	542.80	32.35

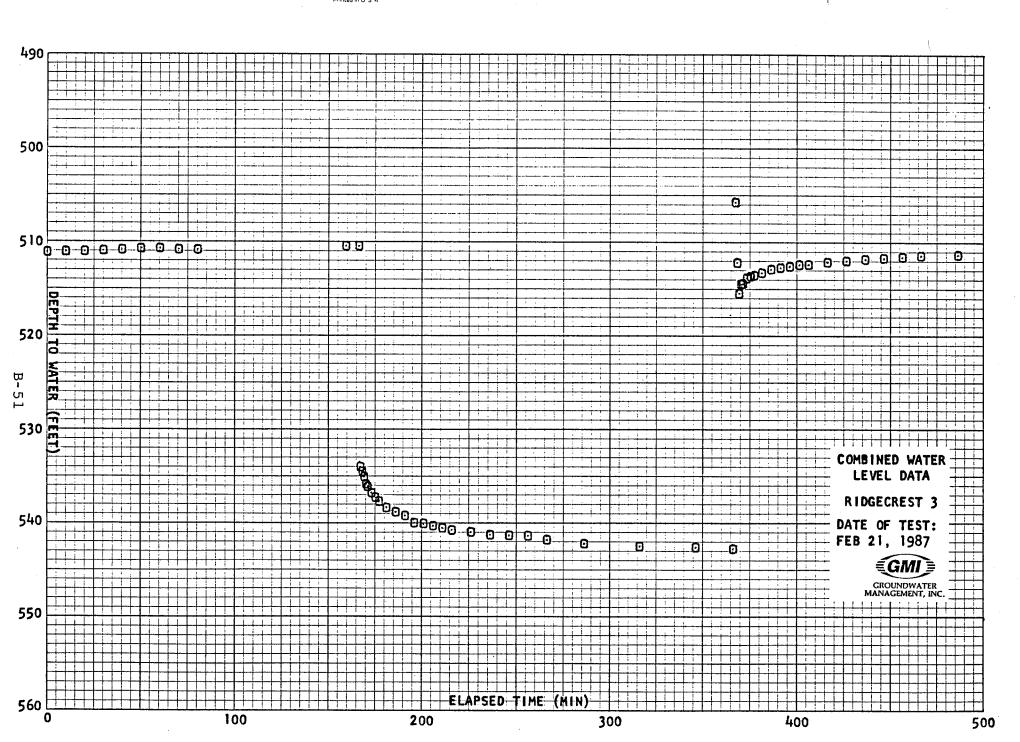
WELL TESTED: RIDGECREST #3

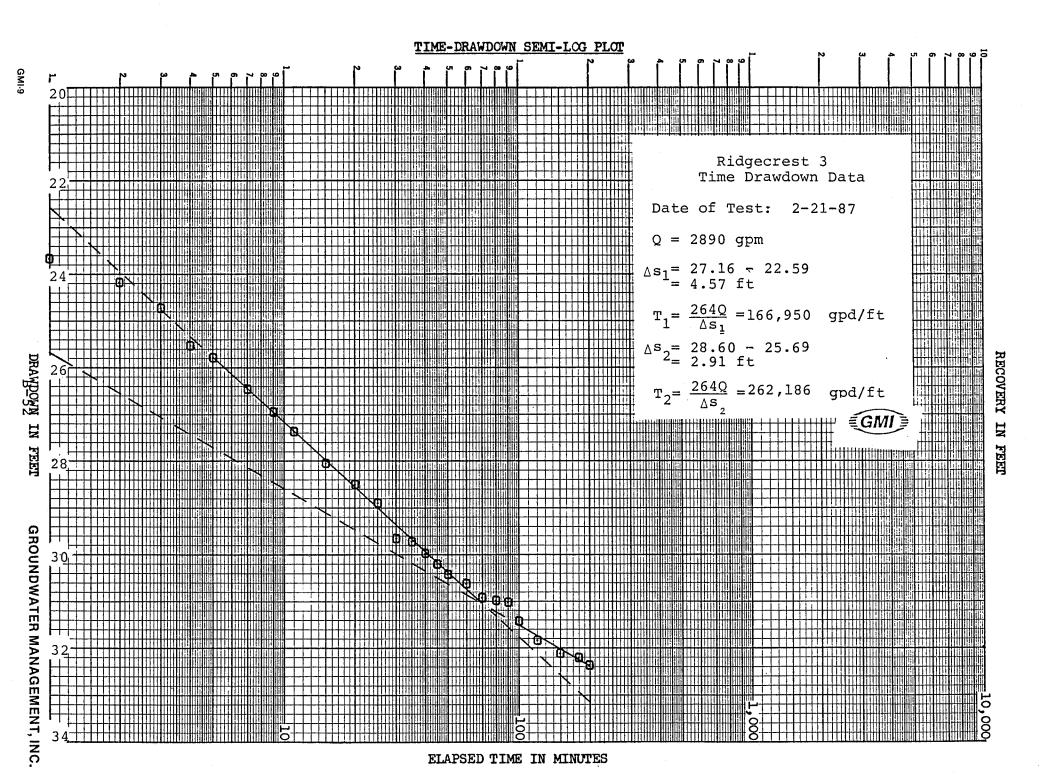
DATE OF TEST: 2/21/87 OPERATOR: DAVID KILLEN

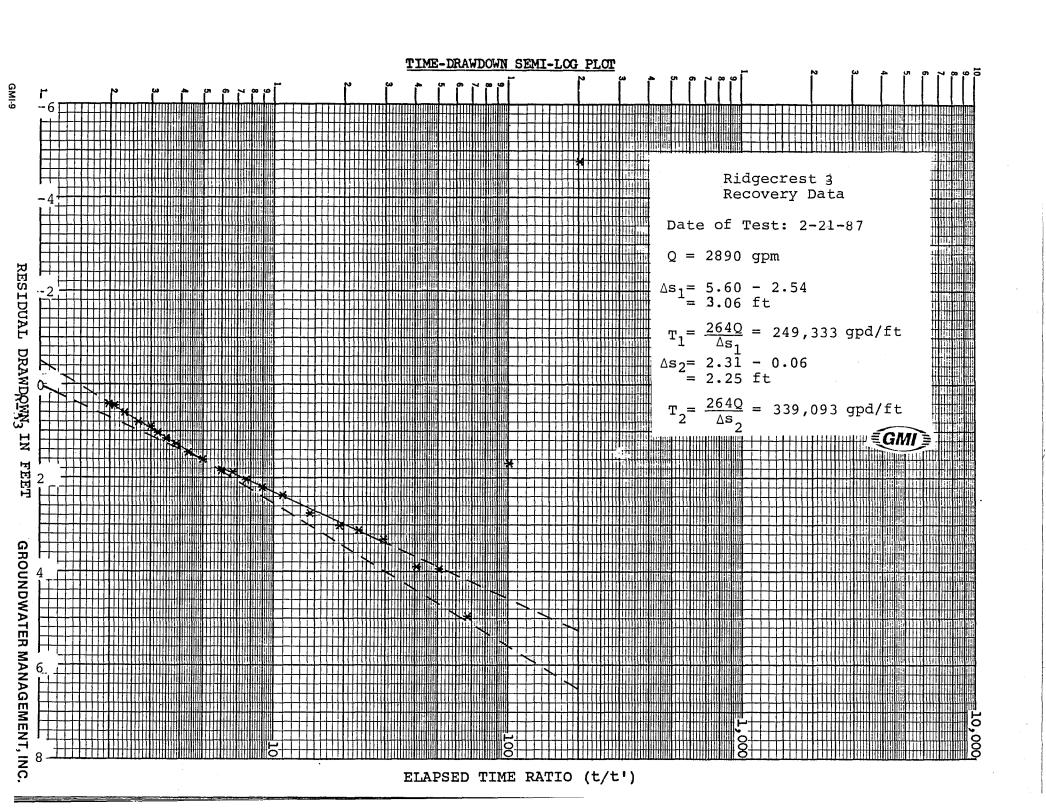
RECOVERY

time pump shut off 200 minutes

	t'	t				WATER	
	ELAPSED	TOTAL				LEVEL	
	TIME	ELAPSED				BELOW	RESIDUAL
TIME OF	OF RECOV.	TIME		HOLDIN	G CUT/ADD	MEAS. PT.	DRAWDOWN
DAY	(min)	(min)	t/t'		(+/- ft)	(ft)	(ft)
1352	1	201	201.00	505	0.65	505.65	-4.80
1353	1 2	202	101.00	510	2.13	512.13	1.68
1354	3	203	67.67	515	0.42	515.42	4.97
1355	4	204	51.00	515	-0.60	514.40	3.95
1356	4 5 7	205	41.00	515	-0.65	514.35	3.90
1358	7	207	29.57	515	-1.24	513.76	3.31
1400	9	209	23.22	515	-1.43	513.57	3.12
1402	11	211	19.18	515	-1.53	513.47	3.02
1406	15	215	14.33	515	-1.80	513.20	2.75
1411	20	220	11.00	515	-2.18	512.82	2.37
1416	25	225	9.00	510	2.65	512.65	2.20
1421	30	230	7.67	510	2.49	512,49	2.04
1426	35	235	6.71	510	2.32	512.32	1.87
1431	40	240	6.00	510	2.30	512.30	1.85
1441	50	250	5.00	510	2.05	512.05	1.60
1451	60	260	4.33	510	1.90	511.90	1.45
1501	70	270	3.86	510	1.72	511.72	1.27
1511	80	280	3.50	510	1.60	511.60	1.15
1521	90	290	3.22	510	1.48	511.48	1.03
1531	100	300	3.00	510	1.35	511.35	0.90
1551	120	320	2.67	510	1.25	511.25	0.80
1621	150	350	2.33	510	1.05	511.05	0.60
1651	180	380	2.11	510	0.90	510.90	0.45
1711	200	400	2.00	510	0.87	510.87	0.42







WELL NO. Ridgecrest 3
DATE OF TEST: 2/21/87

•	discharge pressure (lbs)	temperatur (F)	e sand (cc)	sand (ppm)	power meter (rpm)	pH	conductivity (umho/cm)	totalizer (gal*1000)	flow rate (gpm)
0								92119.0	
5			0.20	21.13					
15			0.20	0.00					
30	37.5	74	0.20	0.00				92200.1	2703
45			0.20	0.00					
60	37.0	74	0.20	0.00				92286.0	2863
90	37.0	73						92372.6	2887
120	37.0	72						92459.4	2893
150	37.0	72			11.8	8.0	360	92546.4	2900
180	37.0	72						92633.4	2900
200								92691.4	2900

200 min. totalizer reading (gal) - 30 min. totalizer reading (gal) average discharge rate (gpm) = ______ * 1000

200 min. - 30 min.

EFFICIENCY COMPUTATIONS

PROJECT: City of Albuquerque NM DATE OF TEST: Feb 21 1987

LOCATION: Ridgecrest WELL NO.: 3 JOB NO.: 39 - 0123

PUMPING RATE, Q = 2890 gpm

DISCHARGE PRESSURE = 37.0 psi

= 85.5 ft

COLUMN PIPE HEAD LOSS = 23.8 ft

PUMPING WATER LEVEL = 542.6 ft

TOTAL HEAD, H = 651.8 ft

WATER HORSEPOWER, WHP = Q * H / 3960 = 475.7 hp

ELECTRIC METER:

MULTIPLIER = 400

Kh = 1.8

REVOLUTIONS = 10 rev SECONDS = 51 sec

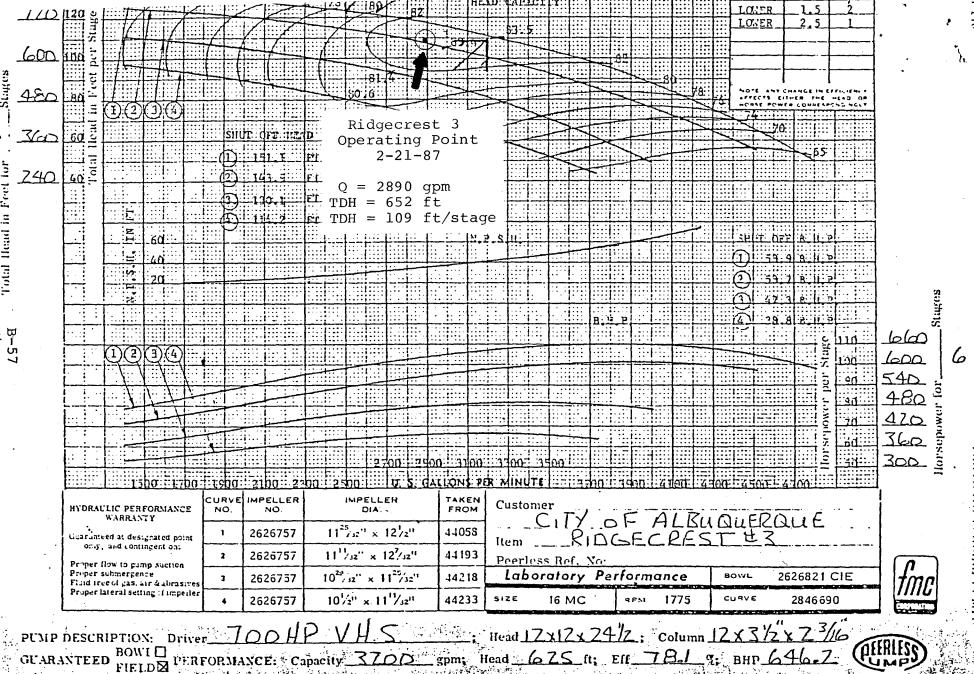
SECONDS - SI SEC

INPUT HORSEPOWER, IHP = 4.826 * Kh * MULTIPLIER * REV/SEC = 681.3 hp

WIRE TO WATER EFFICIENCY = WHP / IHP * 100 = 69.8 %

Prepared by GROUNDWATER MANAGEMENT, INC.

J1010		The state of the s
`odel:	Pump Setting too 660	Static Level
pe: HU	No. of Stages Lo	12/20/81 Pumping Level 599
C1. Design: B	Bowl Size 16 MC	Impeller Sett.
de: F	Bowl Ser.# 2728401	T.D.H. 652.5'
ame 5810 P	Impeller Ser.# 272(69)	Dia. of Casing
r.# C604705.847-85.20125	Pump Ser.#(231265) V23054	Total Depth 1475'
P. 700	Impeller Dia.	Dia. of Discharge 12"
RPM 1775	Pump Curve Sheet No. 131265	Ft. of Tail Pipe 10'x 12"
. AMPS 87	Pump Eff. When New	Strainer YES 12"
ilts 4160	Dia. of 011 Tube 31/2" Pe	REDRATED - 620 TO 1436
vole 60	Dia. of Line Shaft 23/16"	
ase 3	Dia. of Column Pipe 12''	
'ng CONT.	Length of Column Pipe 20'	
se 40°C	Length of Line Shaft 20'	
ro Factor 1.15	Length of Head Shaft 203"	
per Bearing		,
Mer Searing ATION: RIDGECREST	WELL # 3 4	15 VIRGINIA S.E.



P.O. BOX 1884 - 525 NORTH EIGHTH STREET, SALINA, KNSAS 913/825-7186

GROUNDWATER MANAGEMENT, INC.

ATTN: BRET OVERHOLTZER

610 S. 38TH

KANSAS CITY, KS 66106

SAMPLE: RIDGECREST #3

REPORT DATE: 03/24/87

SAMPLE RECEIVED: 03/03/87

DATE SAMPLED: 02/21/87

TIME SAMPLED: 1231

WILSON LABS FILE NO.: 87-9668 LAB NO.: 87030465

GENILEMEN:

ANALYTICAL QUALITY CHECKS HAVE BEEN PERFORMED ON THIS ANALYSIS TO ASSURE THAT NO SIGNIFICANT ERROR HAS OCCURRED. THE ION BALANCE HAS BEEN CALCULATED FROM THE LABORATORY ANALYSIS. THE ION BALANCE STANDARD DEVIATION, CALCULATED BY STANDARD METHODS PROCEDURE NUMBER 104C.1. (15TH ED.), IS SHOWN FOR YOUR INFORMATION. A STANDARD DEVIATION BETWEEN +/-1.0 IS NORMALLY ACCEPTABLE.

THE TOTAL IONIC STRENGTH OF THE WATER HAS ALSO BEEN CALCULATED BY THE COMPUTER. COMPUTATION OF TOTAL DISSOLVED SOLIDS HAS BEEN PERFORMED BASED ON THE CHEMICAL ANALYSIS CORRECTED FOR LOSS OF WATER AND CARBON DIOXIDE WHICH OCCURS UPON DRYING. THIS REPORTED TOTAL DISSOLVED SOLIDS VALUE IS COMPARABLE TO THAT WHICH WOULD BE OBTAINED BY STANDARD METHODS ANALYSIS NUMBER 209B. (15TH ED.)

TOTAL DISSOLVED SOLIDS CONCENTRATION OF THE WATER IS LOW.

THIS IS A MODERATELY HARD WATER.

LOW HARDNESS FAVORS LAUNDRY AND MOST DOMESTIC AND INDUSTRIAL USES. HIGH HARDNESS FAVORS USE AS DRINKING WATER, SO LONG AS IT IS NOT EXCESSIVE.

NON-CARBONATE HARDNESS IS PRESENT, AS INDICATED BY THE EXCESS OF TOTAL HARDNESS OVER TOTAL ALKALINITY.

THIS WATER HAS A NORMAL PH FOR MOST PURPOSES.

THE SATURATION PH IS THE PH AT WHICH THE WATER IS JUST SATURATED WITH CALCIUM CARBONATE. ACCORDING TO STANDARD METHODS (15TH ED., PP57-60), CALCIUM CARBONATE WILL NOT BE DISSOLVED OR PRECIPITATED WHEN THE WATER PH IS EQUAL TO THE SATURATION PH. IF THE WATER PH IS GREATER THAN THE SATURATION PH, A PROTECTIVE COATING OF CALCIUM CARBONATE WILL BE DEPOSITED ON THE PIPE WALLS. THE SATURATION PH IS CALCULATED WITH CORRECTIONS FOR TEMPERATURE AND SALINITY FROM THE EXPRESSION DEVELOPED BY LARSON AND BUSWELL (JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION, VOL.34, NO. 11, PG. 1676).

THE RYZNAR STABILITY INDEX IS AN INDICATOR OF THE SCALING OR CORROSIVE NATURE OF A WATER. ACCORDING TO STANDARD METHODS (14TH ED., PG. 50), A WATER BECOMES MORE SCALING AS THE STABILITY INDEX DECREASES FROM ABOUT 6.5. AS THE STABILITY INDEX INCREASES FROM 6.5, THE WATER BECOMES MORE CORROSIVE.

THE LANGELIER SATURATION INDEX IS CALCULATED AS THE WATER PH MINUS THE SATURATION PH. ACCORDING TO STANDARD METHODS (15TH ED., PP. 57-60), A SATURATION INDEX OF ZERO INDICATES CALCIUM CARBONATE EQUILIBRIUM, OR A STABLE WATER. A NEGATIVE SATURATION INDEX INDICATES A TENDENCY TO DISSOLVE CALCIUM CARBONATE, OR A CORROSIVE WATER. A POSITIVE VALUE INDICATES A TENDENCY TO DEPOSIT CALCIUM CARBONATE, OR A SCALING WATER.

THE STABILITY INDEX INDICATES THAT THIS WATER IS CORROSIVE AND MAY CAUSE CONSIDERABLE ATTACK ON METAL PIPING. CORRECTIVE TREATMENT IS HIGHLY DESIRABLE.

THE CALCULATED TOTAL FREE CARBON DIOXIDE VALUE IS THE CONCENTRATION OF CARBON DIOXIDE ACTUALLY PRESENT IN THE WATER. CALCIUM CARBONATE IN WATER EXISTS IN EQUILIBRIUM WITH CARBON DIOXIDE. A CERTAIN CONCENTRATION OF CARBON DIOXIDE MUST BE PRESENT TO PREVENT PRECIPITATION OF CALCIUM CARBONATE. THIS CALCULATED VALUE REQUIRED TO PREVENT SCALING IS LISTED AS THE NECESSARY FREE CARBON DIOXIDE. THE EXCESS CARBON DIOXIDE IS THE TOTAL FREE CARBON DIOXIDE MINUS THE NECESSARY FREE CARBON DIOXIDE. IF THE EXCESS CARBON DIOXIDE IS A NECATIVE VALUE, SCALING OR DEPOSITION OF CALCIUM CARBONATE WILL PROBABLY OCCUR. IF THE EXCESS CARBON DIOXIDE IS A POSITIVE VALUE, THE WATER WILL TEND TO BE CORROSIVE OR AGGRESSIVE IN ITS ATTACK ON PIPING AND EQUIPMENT. THE PRESENCE OF POSITIVE OR NEGATIVE CARBON DIOXIDE IS NOT SIGNIFICANT FROM A HEALTH STANDPOINT.

WILSON LABORATORIES

m R Newsomer

LYNN'R. NEWCOMER CHIEF CHEMIST

CHILDE CHILDE

STANDARD CHEMICAL WATER ANALYSIS

GROUNDWATER MAN ATIN: BRET OVER 610 S. 38TH KANSAS CITY, KS SAMPLE:RIDGECRE	RHOLTZER 66106	INC.			REPORT DATE: 03/24/87 DATE SAMPLED: 02/21/87 TIME SAMPLED: 1231 FILE NO.: 87-9668 ORDER NO.: 6081 LAB NO.: 87030465 SAMPLE RECEIVED: 03/03/87
CATIONS					LABORATORY ANALYSIS
CALCIUM	CA+2	MG/L			36.00
HYDROGEN	H+1	MG/L			0.00
IRON, TOTAL	FE	MG/L			0.00
MAGNESIUM	MG+2	MG/L			4.00
MANGANESE	MN+2	MG/L			0.00
POTASSIUM	K+1	MG/L			2.00
SODIUM	NA+1	MG/L			27.00
ANIONS					
BICARBONATE	HCO3-1	MG/T.			109.12
CARBONATE	CO3-2				0.10
CHLORIDE	CL-1	MG/L			43.00
FLUORIDE	F-1	MG/L			0.60
HYDROXIDE	OH-1	MG/L			0.01
NITRATE	NO3-1	MG/L			0.00
PHOSPHATE	PO4-3	MG/L			0.00
SULFATE	SO4-2	MG/L			19.00
31 - 12 - 12 - 12 - 12 - 12 - 12 - 12 - 				•	2.25
CATION TOTAL		MEQ/L			3.35
ANION TOTAL		MEQ/L			3.43 -0.08
ION BALANCE STANDARD DEVIAT	וארדיי	MEQ/L			0.5076
ואדאראירה הייאורייים	ILON				0.3070
SILICA			SIO2	MG/L	25.67
TOTAL DISSOLVET	SOLIDS	(CALC)		MG/L	211.09
TOTAL ALKALINIT	TY .	AS	CACO3	•	
CARBONATE ALKAI	LINITY	AS	CACO3	•	89.77
CALCIUM ALKALIN		AS	CACO3		89.77
MAGNESIUM ALKAI		AS	CACO3		
SODIUM ALKALINI	YTY	AS	CACO3		
TOTAL HARDNESS	30	AS	CACO3		
CALCIUM HARDNES		AS	CACO3		
MAGNESIUM HARDN NON-CARBONATE I		AS AS	CACO3	MG/L MG/L	
CALCIUM NON-CAF			داران	MG/L	
MAGNESIUM NON-C			}	MG/L	
PH		PH		/-	7.50
SATURATION PH		PH	UNITS		7.91
STABILITY INDEX	ζ -	PH	UNITS		8.32
SATURATION INDE	EΧ	PH	UNITS		-0.41

GROUNDWATER MANAGEMENT, INC.			03/24/87	PAGE 2
TOTAL FREE CARBON DIOXIDE		MG/L	5.20	
NECESSARY FREE CARBON DIOXIDE	CO2	MG/L	2.03	
EXCESS CARBON DIOXIDE	CO2	MG/L	3.17	
TEMPERATURE OF ANALYSIS FAHRE	NHEIT		77.00	
CONDUCTIVITY, MEASURED @ 25C M	I CROMH	OS/CM	395.	00
CONDUCTIVITY, CALCULATED @ 25C M	OS/CM	332.	51	
CALC. CONDUCTIVITY / MEAS. CONDUC	TIVITY		0.8418	
IONIC STRENGIH	1	MOL/L	0.0047	



5 N. EIGHTH • P.O. BOX 1884 • SALINA, KANSAS 67402-1884 • (913) 825-7186

June 18, 1987

Groundwater Management, Inc.

610 S. 38th

Kansas City, KS 66106

Attn: Bret Overholtzer

Re: Standard Well Water Detection Limits

Wilson Laboratories File No. 87-9668

Dear Mr. Overholtzer:

Below are listed the standard detection limits for the standard well water parameters:

Alkalinity, total

Chloride

Fluoride

Nitrate/Nitrite

Orthophosphate

рН

Specific Conductance

Sulfate

Calcium

Iron

Magnesium

Manganese

Potassium

Silicon

Sodium

 $2 \text{ mg/l as } \text{CaCO}^3$

2 mg/1

 $0.1 \, \text{mg/l}$

0.1 mg/l as N

0.1 mg/l as P

not applicable

2 umhos/cm

10 mg/1

2 mg/1

0.1 mg/l

0.1 (19/1

2 mg/l

0.02 mg/l

2 mg/l

1 mg/l

5 mg/l

All other reported parameters are calculated from the above parameters. When the SWAN Fortran program reads in the values of the above parameters for input into the standard well water report, the Non-detected values are changed to the value 0.00.

If you require any additional information, do not hesitate to call.

WILSON LABORATORIES

Selmadine Siemens

WELL AND PUMP TEST DATA

DOTE OF PUMP TEST : 4-14-

RIDGECREST WELL NO. 4

PCBs

Billy might han equid

Tooking today.

K: Q/A- 2490 gpm

J (b) = (2.333 x (1413-573))

1960 ft²

-244.55 ft/d

1960 ft²

-244.55 ft/d

- LAYNE WESTERN COMPANY, INC. -

WELL DATA SUMMARY SHEET

CITY OF ALBUQUERQUE RIDGECREST WELL NO. 4

DATE OF PUMP TEST: 4-16-1985 TEST DISCHARGE RATE (gpm): 2490 DISCHARGE PRESSURE (psi): 67 STATIC WATER LEVEL (ft): 465 WATER LEVEL MEASUREMENT METHOD: M-Scope PUMP SETTING (ft) : 580 CURRENT SPECIFIC CAPACITY (gpm/ft) : 71 ORIGINAL SPECIFIC CAPACITY (gpm/ft): 65 YEAR DRILLED : 1974 BOREHOLE DIAMETER (in) : 28 WELL DEPTH (ft): 1425 SCREEN TYPE : Shutter Screen (Assumed)

COMMENTS: Discharge measured with all-flow meter.

SCREEN INTERVAL (ft): 573 - 1413

LAYNE-WESTERN COMPANY, INC. HYDROLOGY DIVISION PUMP TEST DATA

NAME: <u>CITY OF ALBUQUERQUE</u> DATE: <u>4-16-1985</u>

LOCATION: RIDGECREST WELL NO.: 4 JOB NO.: D-699

TIME OF DAY	ELAPSED TIME	WATER LEVEL	DRAWDOWN
47547		4/4/1	0.00
1216	0	464.61	0.00
1217	1	493.69	29.08 70.70
1218	2 3	495.31	30.70 31.25
1219 1220	3 4	495.86 496.11	
1220	· 5		31.50
	ם 7	496.33	31.72
1223		496.22	31.61
1225	9	497.01	32.40
1227	11	497.25	32.64
1231	15	497.62	33.01
1236	20	497.93	33.32
1241	25	498.19	33.58
1246	30 	498.36	33.75
1251	35	498.51	33.90
1256	40	498.69	34.08
1301	45	498.81	34.20
1306	50	478.89	34.28
1316	60	499.03	34.42
1326	70	499.18	34.57
1336	80	499.28	34.67
1346	90	499.40	34.79
1356	100	499.49	34.88
1406	110	499.55	34.94
1416	120	499.65	35.04
1446	150	499.77	35.16
1516	180	499.86	35.25
1546	210	499.94	35.33
1616	240	499.98	35.37
1646	270	500.06	35.45
1716	300	500.09	35.48

LAYNE-WESTERN COMPANY, INC. HYDROLOGY DIVISION PUMP TEST DATA

NAME: CITY OF ALBUQUERQUE

DATE: 4-16-1985

LOCATION:

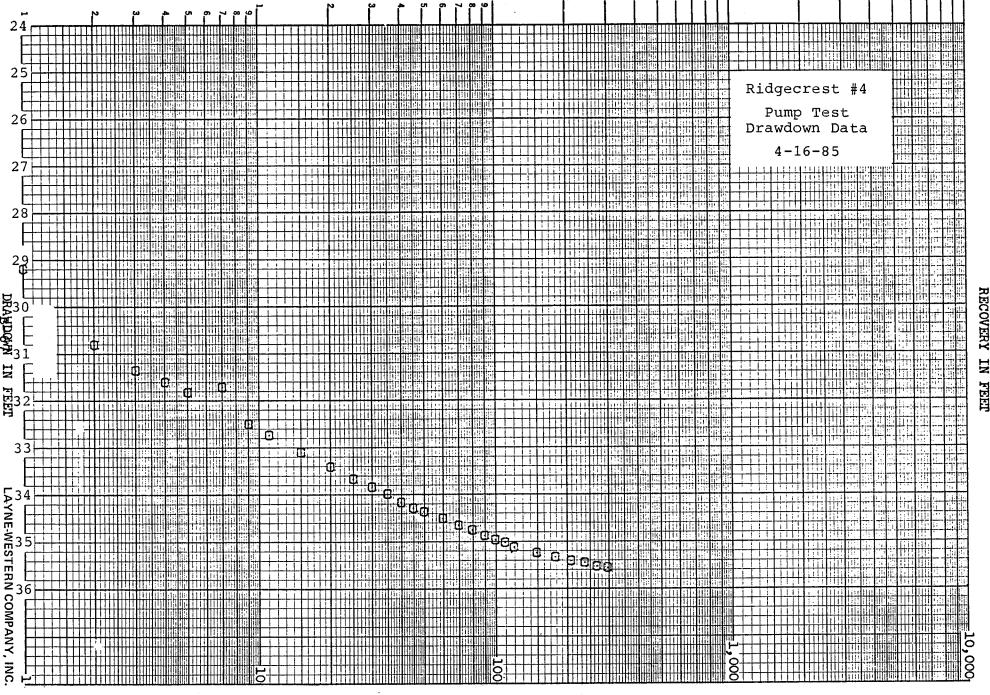
RIDGECREST

WELL NO.: 4

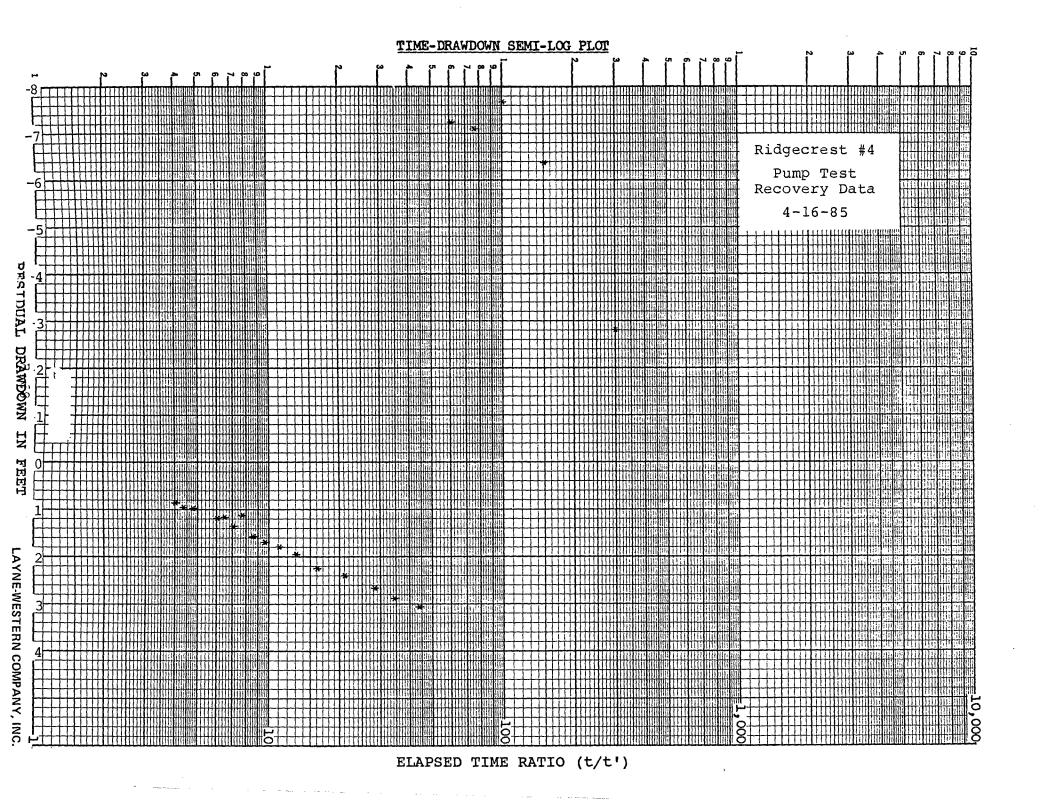
JOB NO.: D-699

RECOVERY DATA

TIME OF DAY	ELAPSED TIME t,min	TIME SINCE SHUT OFF t',min	RATIO t/t'	WATER LEVEL	RESIDUAL DRAWDOWN ft
1216	0	:	0.00	464.61	0.00
1717	301	1	301.00	461.81	-2.80
1718	302	2	151.00	458.24	-6.37
1719	303	2 3	101.00	456.95	-7.66
1720	304	4	76.00	457.52	-7.09
1721	305	5	61.00	457.38	-7.23
1.723	307	7	43.86	467.70	3.09
1725	309	9	34.33	467.52	2.91
1727	311	11	28.27	467.30	2.69
1731	315	15	21.00	467.03	2.42
1736	320	20	16.00	466.88	2.27
1741	325	25	13.00	466.58	1.97
1746	330	30	11.00	466.42	1.81
1751	335	35	9.57	466.32	1.71
1756	340	40	8.50	466.20	1.59
1801	345	45	7.67	465.75	1.14
1806	350	50	7.00	465.98	1.37
1811	355	55	6.45	465.79	1.18
1816	360	60	6.00	465.81	1.20
1836	380	80	4.75	465.60	0.99
1846	390	90	4.33	465.58	0.97
1856	400	100	4.00	465.48	0.87



ELAPSED TIME IN MINUTES



LAYNE-WESTERN COMPANY, INC. HYDROLOGY DIVISION EFFICIENCY DATA

NAME: CITY OF ALBUQUERQUE

DATE: 4-16-1985

LOCATION: RIDGECREST

WELL NO.: <u>4</u>

JOB NO.: D-699

FUMPING RATE, Q(gpm) = 2490

DISCHARGE PRESSURE(psi) = 67.0

(ft) = 154.8

PUMPING WATER LEVEL(ft) = 500.0

TOTAL HEAD, H(ft) = 654.8

WATER HORSEPOWER, WHP = QH/3960 = 411.7

ELECTRIC METER:

MULTIPLIER = 400

Kh = 1.8

REV/SEC = 0.172

INPUT HORSEPOWER, IHP = 4.826 * Kh * MULTIPLIER * REV/SEC IHP = 597.7

WIRE-TO-WATER EFFICIENCY(%) = WHP/IHP * 100 = 68.9

LAYNE-WESTERN COMPANY, INC. HYDROLOGY DIVISION EFFICIENCY DATA

NAME: CITY OF ALBUQUERQUE DATE: 4-16-1985

LOCATION: RIDGECREST WELL NO.: 4 JOB NO.: D-699

PUMPING RATE, Q(gpm) = 2490

DISCHARGE PRESSURE(psi) = 67.0

(ft) = 154.8

DISCHARGE HEAD LOSS(ft) = 15.0

PUMPING WATER LEVEL(ft) = 500.0

TOTAL HEAD, H(ft) = 669.8

WATER HORSEPOWER, WHP = QH/3960 = 421.1

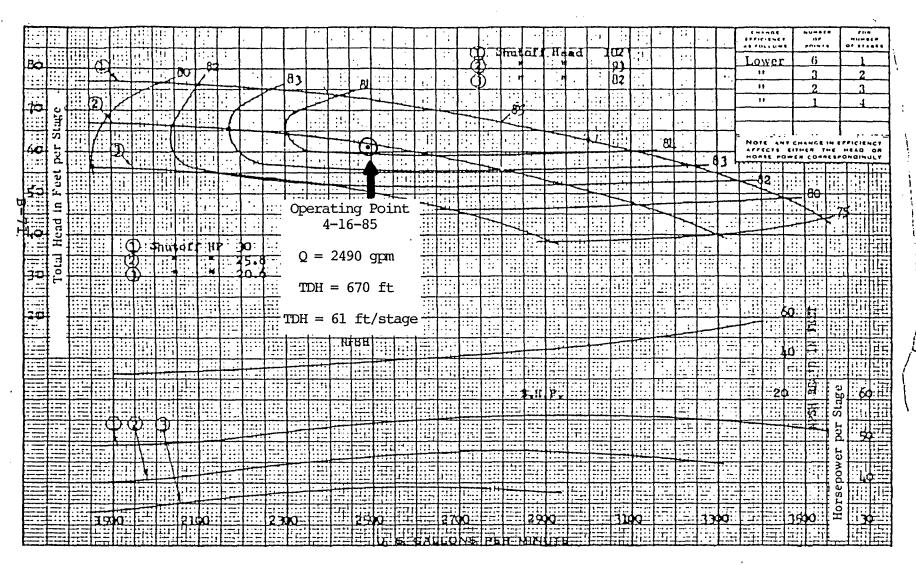
ELECTRIC METER:

MULTIPLIER = 400

< h = 1.8

REV/SEC = 0.172

OVERALL MECHANICAL EFFICIENCY(%) = WHF/IHP * 100 = 70.5



RIDGECREST , NO.T 11-STAGE 14HAB, PEERLESS , MEELLER V4400L-E, FULL OFFICE OLICTAI, ED ADT.

P.O. BOX 1858 - 528 NORTH NINTH STREET, SALINA, KANSAS 913/825-7186

LAYNE-WESTERN COMPANY INC. - 2

ATTN: CARL NUZMAN 610 SOUTH 38TH

KANSAS CITY, KS 66106

SAMPLE:ALBUQUERQUE RIDGECREST WELL #4

WILSON LABS FILE NO.: 85-9540

REPORT DATE: 05/13/85

SAMPLE RECEIVED: 04/24/85

DATE SAMPLED: 04/16/85

TIME SAMPLED: NOT GIVEN

LAB NO.: 85050204

GENTLEMEN:

ANALYTICAL OUALITY CHECKS HAVE BEEN PERFORMED ON THIS ANALYSIS TO ASSURE THAT NO SIGNIFICANT ERROR HAS OCCURRED. THE ION BALANCE HAS BEEN CALCULATED FROM THE LABORATORY ANALYSIS. THE ION BALANCE STANDARD DEVIATION, CALCULATED BY STANDARD METHODS PROCEDURE NUMBER 104C.1. (15TH ED.). IS SHOWN FOR YOUR INFORMATION. A STANDARD DEVIATION BETWEEN +/-1.0 IS NORMALLY ACCEPTABLE. THE STANDARD DEVIATION FOR THIS SAMPLE IS NOT WITHIN THE NORMALLY ACCEPTABLE LIMITS, WHICH INDICATES THAT ADDITIONAL CONSTITUENTS ARE PRESENT WHICH HAVE NOT BEEN ANALYZED. THE POSITIVE VALUE OF THE ION BALANCE INDICATES THE PRESENCE OF ADDITIONAL ANIONS.

THE TOTAL IONIC STRENGTH OF THE WATER HAS ALSO BEEN CALCULATED BY THE COMPUTER. COMPUTATION OF TOTAL DISSOLVED SOLIDS HAS BEEN FERFORMED BASED ON THE CHEMICAL ANALYSIS CORRECTED FOR LOSS OF WATER AND CARBON DIOXIDE WHICH OCCURS UPON DRYING. THIS REPORTED TOTAL DISSOLVED SOLIDS VALUE IS COMPARABLE TO THAT WHICH WOULD BE OBTAINED BY STANDARD METHODS ANALYSIS NUMBER 209B. (15TH ED.)

THE SILICA LEVEL IS HIGH, BUT DOES NOT AFFECT DRINKING WATER QUALITY.

TOTAL DISSOLVED SOLIDS CONCENTRATION EXCEEDS THE DESIRABLE LINIT OF 250 Mg/L. BUT IS NOT HIGH ENOUGH TO BE OF CONCERN FOR MOST USES.

THIS IS A MODERATELY HARD WATER.

LOW HARDNESS FAVORS LAUNDRY AND MOST DOMESTIC AND INDUSTRIAL USES. HIGH HARDNESS FAVORS USE AS DRINKING WATER, SO LONG AS IT IS NOT EXCESSIVE.

NON-CARBONATE HARDNESS IS PRESENT, AS INDICATED BY THE EXCESS OF TOTAL HARDNESS OVER TOTAL ALKALINITY.

THIS WATER HAS A NORMAL PH FOR MOST PURPOSES.

THE SATURATION PH IS THE PH AT WHICH THE WATER IS JUST SATURATED WITH CALCIUM CARBONATE. ACCORDING TO STANDARD METHODS (15TH ED., PF57-60). CALCIUM CARBONATE WILL NOT BE DISSOLVED OR PRECIPITATED WHEN THE WATER PH IS EQUAL TO THE SATURATION PH. IF THE WATER PH IS GREATER THAN THE SATURATION PH. A PROTECTIVE COATING OF CALCIUM CARBONATE WILL BE DEPOSITED ON THE PIPE WALLS. THE SATURATION PH IS CALCULATED WITH CORRECTIONS FOR TEMPERATURE AND SALINITY FROM THE EXPRESSION DEVELOPED BY LARSON AND BUSWELL (JOURNAL OF THE AMERICAN WATER WORKS ASSOCIATION. VOL.34. NO. 11.PG. 1676).

THE RYZNAR STABILITY INDEX IS AN INDICATOR OF THE SCALING OR CORROSIVE NATURE OF A WATER. ACCORDING TO STANDARD METHODS (14TH ED., PG. 50). A WATER BECOMES MORE SCALING AS THE STABILITY INDEX DECREASES FROM ABOUT 6.5. AS THE STABILITY INDEX INCREASES FROM 6.5. THE WATER BECOMES MORE CORROSIVE.

THE LANGELIER SATURATION INDEX IS CALCULATED AS THE WATER PH MINUS THE SATURATION PH. ACCORDING TO STANDARD METHODS (15TH ED., PP. 57-60), A SATURATION INDEX OF ZERO INDICATES CALCIUM CARBONATE EQUILIBRIUM, OR A STABLE WATER. A NEGATIVE SATURATION INDEX INDICATES A TENDENCY TO DISSOLVE CALCIUM CARBONATE, OR A CORROSIVE WATER. A POSITIVE VALUE INDICATES A TENDENCY TO DEPOSIT CALCIUM CARBONATE, OR A SCALING WATER.

THE STABILITY INDEX INDICATES THAT THIS WATER IS SLIGHTLY AGGRESSIVE AND MAY CAUSE MINOR CORROSION. CORRECTIVE TREATMENT IS SUGGESTED.

THE CALCULATED TOTAL FREE CARBON DIOXIDE VALUE IS THE CONCENTRATION OF CARBON DIOXIDE ACTUALLY PRESENT IN THE WATER. CALCIUM CARBONATE IN WATER EXISTS IN EQUILIBRIUM WITH CARBON DIOXIDE. A CERTAIN CONCENTRATION OF CARBON DIOXIDE MUST BE PRESENT TO PREVENT PRECIPITATION OF CALCIUM CARBONATE. THIS CALCULATED VALUE REQUIRED TO PREVENT SCALING IS LISTED AS THE NECESSARY FREE CARBON DIOXIDE. THE EXCESS CARBON DIOXIDE IS THE TOTAL FREE CARBON DIOXIDE MINUS THE NECESSARY FREE CARBON DIOXIDE. IF THE EXCESS CARBON DIOXIDE IS A NEGATIVE VALUE, SCALING OR DEPOSITION OF CALCIUM CARBONATE WILL PROBABLY OCCUR. IF THE EXCESS CARBON DIOXIDE IS A POSITIVE VALUE. THE WATER WILL TEND TO BE CORROSIVE OR AGGRESSIVE IN ITS ATTACK ON FIFING AND EQUIPMENT. THE PRESENCE OF POSITIVE OR NEGATIVE CARBON DIOXIDE IS NOT SIGNIFICANT FROM A HEALTH STANDPOINT.

WILSON LABORATORIES

R Newsomen

LYNNAR. NEWCOMER CHIEF CHEMIST

STANDARD CHEMICAL WATER ANALYSIS

SAMPLE RECEIVED: 04/24/8	LAYNE-WESTERN COMFANY INC 2 ATTN: CARL NUZMAN 610 SOUTH 38TH KANSAS CITY, KS G6106 SAMPLE:ALBUQUERQUE RIDGECREST WELL #4	REPORT DATE: 05/13/85 DATE SAMPLED: 04/16/85 TIME SAMPLED: NOT GIVEN FILE NO.: 85-9540 ORDER NO.: 9252 LAB NO.: 85050204 SAMPLE RECEIVED: 04/24/85
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CATIONS					LABORATORY ANALYSIS
CALCIUM HYDROGEN IRON, TOTAL MAGNESIUM MANGANESE POTASSIUM SODIUM	CA+2 H+1 FE MG+2 MN+2 K+1 NA+1	MG/L MG/L MG/L MG/L MG/L MG/L MG/L			50.00 0.00 0.00 3.00 0.00 4.20 32.00
ANIONS					
BICARBONATE CARBONATE CHLORIDE FLUORIDE HYDROXIDE NITRATE PHOSPHATE SULFATE	HCO3-1 CO3-2 CL-1 F-1 OH-1 NO3-1 PO4-3 SO4-2	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L			120.77 0.14 52.00 0.40 0.01 0.00 0.00 24.00
CATION TOTAL ANION TOTAL ION BALANCE STANDARD DEVIATION		WEÓ\T WEÓ\T WEÓ\T			4.24 3.97 0.27 -1.6013
SILICA TOTAL DISSOLVED TOTAL ALKALINIT CARBONATE ALKAL CALCIUM ALKALINI TOTAL HARDNESS CALCIUM HARDNESS MAGNESIUM HARDNESS MAGNESIUM HON-CARBONATE HI CALCIUM NON-CARBONATE	Y IN LTY IN LTY IN LTY IY 6 ESS ARDNESS BONATE HI ARBONATE	AS AS AS AS AS AS ARDNESS	SIO2 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 CACO3 UNITS UNITS UNITS UNITS	MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	47.27 272.49 100.00 99.46 99.46 0.00 0.00 137.20 124.85 12.35 37.74 25.39 12.35 7.60 7.73 7.86 -0.13

LAYNE-WESTERN COMPANY INC 2			05/13/85	PAGE 2
TOTAL FREE CARBON DIOXIDE	C02	MG/L	4.55	
NECESSARY FREE CARBON DIOXIDE	002	MG/L	3.37	
EXCESS CARBON DIOXIDE	C02	MG/L	1.17	
TEMPERATURE OF ANALYSIS FAH	RENHEIT		77.00	
CONDUCTIVITY, MEASURED @ 25C	MICROMH	OS/CM	432	.00
CONDUCTIVITY, CALCULATED @ 250	MICROMH	OS/CM	398	.92
IONIC STRENGTH		MOL/L	0.0057	

525 N. EIGHTH • P.O. BOX 1884 • SALINA, KANSAS 67402-1884 • (913) 825-7186

June 18, 1987

Groundwater Management, Inc.

610 S. 38th

Kansas City, KS 66106

Attn: Bret Overholtzer

Re: Standard Well Water Detection Limits

Wilson Laboratories File No. 87-9668

Dear Mr. Overholtzer:

Below are listed the standard detection limits for the standard well water parameters:

 $2 \text{ mg/l as } \text{CaCO}^3$ Alkalinity, total 2 mg/lChloride Fluoride $0.1 \, \text{mg/l}$ Nitrate/Nitrite 0.1 mg/l as NOrthophosphate 0.1 mg/l as Pnot applicable 2 umhos/cm Specific Conductance 10 mg/lSulfate 2 mg/lCalcium

Silicon 1 mg/l Sodium 5 mg/l

All other reported parameters are calculated from the above parameters. When the SWAN Fortran program reads in the values of the above parameters for input into the standard well water report, the Non-detected values are changed to the value 0.00.

If you require any additional information, do not hesitate to call.

WILSON LABORATORIES

Demaclus Lineiros
Bernadine Siemens